OCTOBER 7, 1968

OFFICE OF DIRECTOR – MSFC

CODE	NAME	INIT.	☐ ACTION	☐ INFORMATION
	Dr. von Braun			

REMARKS

a. Funds have been made available to R&DO to fund the second shift at Comp Lab to operate the 8900 Hybrid Computer in the design analysis of the ATM and Orbital Workshop control systems.

b. The Slidell Hybrid Computer will be relocated in Astrionics and operated by Comp Lab. This computer will be used in the design analysis of the Orbital Workshop control system and for simulation utilizing Orbital Workshop control system hardware. $20,000 has been made available for Astrionics to make the necessary modifications to the computer. The computer will be relocated in January.

c. In addition, MSC has an excess 8400 Hybrid Computer which Comp Lab is attempting to acquire.

Fine. Thanks for fast action

B 11-9

CODE	NAME	DATE
DIR	J. T. Shepherd	11-8-68

MSFC - Form 495 (Rev August 1963)

NOTES 10/7/68 HAEUSSERMANN B 10-11

10/7 9AB

1. AAP Simulation Support. Astrionics Laboratory is presently working with R-COMP to provide increased Hybrid Computer Time to support the Orbital Workshop and ATM Control System Design and Analysis. Presently available Hybrid Computer Time has not been adequate for this work due to the higher priority for Saturn requirements and personnel reductions of R-COMP. This Laboratory is proposing to solve this acute problem by the following methods:

Shep
Please look into all pertinent aspects. If desirable to Below and feasible let's push implementation
B

a. Make available approximately 75K of AAP funds to R-COMP to allow a second shift operation of their 8900 Hybrid Computers to support the design analysis of ATM and OWS Control Systems.

b. Propose to move a Hybrid Computer which is now at Slidell and is very lightly loaded (2-3%) to R-ASTR and to use this computer for OWS Control System design analysis and for simulation utilizing OWS Control System hardware. This system will require some additional memory which will cost approximately $20K. ✓

2. Delta/Comsat Payload Review Committee. Dr. Herman Thomason, Deputy Chief of the Inertial Sensors and Stabilizers Division, participated in the review committee's meetings at Goddard and KSC. At GSFC, the telemetry records and flight movies were thoroughly reviewed. Since the type of failure of the Delta/Nimbus Payload was quite similar to the Delta/Comsat Payload failure, a briefing was also given on the findings of the Nimbus Review Committee. The conclusions on the Nimbus findings were that the Delta yaw rate gyro was mounted 90 degrees from its correct position. At KSC, the Committee reviewed the test procedures and changes to the hardware which were made at KSC. The Comsat Committee will meet this week at the Douglas facility in Santa Monica. During the week of October 13, the Committee will meet at Goddard to issue a preliminary report to allow the release of five similar Delta vehicles, one of which is scheduled for launch in December 1968 with another Comsat payload. ✓

!!

noted PJL 10/21

3. Personnel Achievement. James W. Steincamp, who is with us in a graduate student space and of our Advanced Studies Office, received his Ph.D. in mathematics from the University of Alabama at the end of August. ✓

2417

R&D OPERATIONS

CODE	NAME	INIT.	☐ ACTION	☐ INFORMATION
DIR	Mr. Shepherd			

REMARKS

In connection with Dr. Haeussermann's 10-7-68 von Braun NOTES, attached for your information is a recent memo covering various aspects of the operation of the Computation Laboratory, which includes making available funding to R-COMP to allow second shift operation of their 8900 Hybrid Computers to support the design analysis of ATM and OWS Control Systems.

In discussions with Mr. Hueter today, they are agreeable to relocating the Hybrid Computer at Slidell to ASTR for use in the OWS Control Systems design and simulation, utilizing OWS Control System hardware.

You will note from the memo that Dr. Haeussermann's NOTES really resulted from a series of discussions on which action had already been initiated.

Also attached is a copy of a memo to Harry Gorman which seeks additional equipment for the Computation Laboratory to further enhance our hybrid computer capability.

2 Enc:
a/s

CODE	NAME	DATE
R-DIR	R. W. Cook	11/5/68

MSFC - Form 495-1 (October 1963)

DEP-A ACTION TO Mr. Hutto

INFO COPY Mr Gorman

GEORGE C. MARSHALL SPACE FLIGHT CENTER
HUNTSVILLE, ALABAMA

Memorandum

THRU Mr. Weidner, R-DIR

TO Mr. Gorman, DEP-A DATE October 31, 1968

FROM Director, Computation Laboratory
R-COMP-DIR

SUBJECT Excess Hybrid System at MSC

We understand that MSC is planning to release an EAI 8400 system. We would like to enlist your aid in effecting the transfer of this machine to MSFC. The addition of the MSC 8400 system to MSFC's 8900 hybrid system would provide Computation Laboratory with the machine time required to solve our current approved hybrid problems.

Presently the hybrid computers at MSFC are overloaded to the point that necessary work must be postponed. The main hybrid complex in Computation Laboratory is now scheduled on the basis of a 96-hour week. The EAI 8400 at MSC is identical to the digital computer of our system and could be put to immediate use to relieve the current overload problem.

In order to accomplish the required hybrid studies requested and approved, the following possibilities must be investigated.

a. Two or three shift operation of both hybrid systems.

b. Inability to perform in-house requirements because of lack of machine time. As an example, the ATM Project Manager has assigned priorities to all ATM hybrid studies, with the result that some approved work cannot be done because of lack of machine time.

c. Acquiring additional equipment to fulfill present and future requirements. Computation Laboratory has requested that the Slidell hybrid system be moved to MSFC to help relieve our machine time overload.

The choices of multi-shift operation, inability to perform approved jobs, and acquisition of additional equipment appear to be the only approaches available to us. These choices are evaluated as follows.

a. Multi-shift operation is currently unacceptable because the Laboratory's subcontract with EAI is to provide six-day (Monday through Saturday) 16 hours per day uptime on the 8900 system. The Laboratory does not have programming and operating personnel to man a three-shift operation.

b. Machine requirements on both of the Laboratory's hybrid systems are now in excess of the basic 40-hour week. The present time requirements on the 8900 system are approximately 90 hours per week. Therefore, work on some hybrid problems cannot be performed because of lack of machine time.

c. Since acquiring additional equipment seems the only reasonable solution to our machine time requirements, the acquisition of MSC's 8400 digital computer would be most desirable.

Since Computation Laboratory already has a large amount of EAI 8000 series equipment, the compatibility of the MSC 8400 system, if acquired, could easily be tied into existing analog computers to perform hybrid computation. This is a basic need of the Laboratory.

H. Hoelzer

GEORGE C. MARSHALL SPACE FLIGHT CENTER
HUNTSVILLE, ALABAMA

Memorandum

TO Mr. Gorman, DEP-A DATE NOV 6 1968

FROM Assistant Director, R&D Operations, R-DIR

SUBJECT Excess Hybrid System at MSC

We understand that MSC is planning to release a Government-owned EAI 8400 Computer System. The addition of the MSC 8400 System to MSFC's 8900 Hybrid System would provide our Computation Laboratory with the capability and machine time to be able to undertake and keep abreast of our current requirements in the Saturn Apollo Program and the increasing requirements in the Apollo Applications Program requiring hybrid computer capability.

Presently, the hybrid computers at MSFC are overloaded to the point that necessary work is postponed. The main hybrid complex in the Computation Laboratory is now scheduled on a 96-hour work week (6 days at 16 hrs, 2 shifts) with the remaining shift used for maintenance. The EAI 8400 at MSC is identical to the digital computer of the 8900 System in the Computation Laboratory, and could be put to immediate use to relieve the current overload problem involving primarily math models to support the design analysis of Orbital Workshop and ATM Control Systems.

This requirement is separate and distinct from the requirements to transfer the Hybrid Computer System from Slidell to ASTR, that I mentioned to you earlier, which is being worked out with IO separately. This consists of a Raytheon 520 and Electronic Associates 231 RV's with associated equipment to meet on-line or real time requirements associated with proving the design and function of subsystems and hardware for the ATM and Orbital Workshop.

In our forthcoming ADP Management Decision Group Meeting, Mr. Prince will cover these two items along with the specialized equipment you asked him to summarize.

Encl

In the meantime, we would like to enlist your aid in transfer of the MSC 8400 System to MSFC's 8900 Hybrid System in the Computation Laboratory.

Accordingly, a suggested memo to Mr. Hjornevik is attached for your signature.

R. W. Cook

1 Enc:
a/s

cc:
DEP-A, Mr. Newby
E-DIR, Mr. Maus
I-DIR, Mr. Hueter
R-COMP-DIR, Dr. Hoelzer/Mr. Prince

bcc:
DIR, Mr. Shepherd

DEP-A

R-DIR

TO Manned Spacecraft Center
Attention: Mr. Hjornevik, AD

FROM Deputy Director, Administrative

SUBJECT Excess Hybrid System at MSC

We understand that MSC is planning to release a Government-owned EAI 8400 Computer System. The addition of the MSC 8400 System to MSFC's 8400 Hybrid System would provide our Computation Laboratory with the capability and machine time to be able to undertake and keep abreast of our current requirements in the Saturn Apollo Program and the increasing requirements in the Apollo Applications Program requiring hybrid computer capability.

We would appreciate very much an indication as to the availability of the EAI 8400 so arrangements can be made with your office for the transfer.

Harry H. Gorman

Enc

R&D OPERATIONS

CODE	NAME	INIT.	☐ ACTION	☐ INFORMATION
	Harry Gorman			

REMARKS

When you have a spare moment, I'd like to be filled in on the 360 computer that Boeing tells they need them next July, ie the meeting that you attended in ID friday a.m. I understand they partially based their requirements on Aero's need. We are following up monday with Aero & Comp on a P.O. & memo submitted by Gorsker requesting we arrange to have a part of Boeings Program they are most interested in reprogrammed to the 1108

CODE	NAME	DATE
	[signature]	10/5

MSFC - Form 495-1 (October 1963)

Annie J 10/9

Jackie
Please note → This meeting is not now necessary; I have discussed with Carl Price

9/30/68 Wkly Notes

[signature]

NOTES 9/30/68 GEISSLER

B 10-1

1. AS-503/C' Mission Activities: Translunar injection targeting (variable azimuth) and verification trajectories of the AS-503 launch vehicle for the December window C' mission were completed by Boeing on 9/23/68. A preliminary operational trajectory report was put into distribution on 9/25/68, one day behind our originally planned schedule. Required working information, including guidance presettings, was delivered to Astrionics and to MSC on schedule. The pitch attitude for the S-IVB propellant dump (slingshot) after CSM separation was selected to be 180 deg from the local horizontal. This is the optimum attitude for CCS communications. MSC is also satisfied with the dump attitude with respect to CSM avoidance. However, for the nominal case of propellant dump, which will impart a velocity impulse of approximately 28 m/sec, the S-IVB/IU will impact the moon. Missing the moon was a third priority objective after spacecraft avoidance and non-earth return. We had not been planning to do lunar targeting until AS-505. This milestone for AS-503 C' was reached due to some extraordinary work on the part of Boeing and our own civil service personnel. ✓Boeing has been working essentially a 24-hour a day, seven-day week operation to support this effort. Mr. Moore at Boeing has led the targeting and operational trajectory effort. Civil service lead individuals were Messrs. O. Hardage and G. Wittenstein. ✓

2. Computation Laboratory Support: Computation Laboratory has eliminated the use of the IBM 7094 computers on weekends. Indications are that a further reduction in 7094 computer usage is planned, such as elimination of the third shift. We do not feel that this Laboratory can afford this reduction in Computation support. The loss of computer support necessitates that we run only the highest priority work which means that the AS-205 and AS-503 C' Missions consume almost 100% of our available computer time. This procedure is already beginning to strangle the normal non-urgent workload that is required for future missions. It requires up to two weeks to get a production run back on non-priority jobs. In addition, our demands for support of launches, studies in support of NASA Headquarters requests, and support of other Centers are not only more numerous but are becoming more complex. The Computation Laboratory has been requested to convert Boeing's lunar targeting computer program to the 1108 system to provide an MSFC in-house capability for rapid response targeting. Now we are totally dependent on Boeing with no means to verify what they are doing. We expect that rapid reaction for mission changes will become a way of life in the future ✓and this type of support may be impractical to get out of Boeing. An informal response from Computation Laboratory indicated they did not have the programming support to support the conversion of the targeting program to the 1108 computer. In addition to these problems, Computation Laboratory's results for Lockheed and Northrop are deteriorating. Computer turnaround time is continuing to increase due partly to operating errors and machine failures. For example, for our Dynamic and Flight Mechanics Division, in August, of the ≈ 190 IBM 7094 runs made, twenty-seven runs experienced machine failure or operator error, resulting in a lost run or severe delay. Based on 178 runs of 10 minutes duration or less, average turnaround time was 32 hours. Average turnaround time increased from 20 hours in June to 25 hours in July to 32 hours in August. This problem is common to other Divisions in the Laboratory as well.

Harry G. I guess it's mandatory to relax some of our arbitrary measures in this area. This kind of situation can become a critical danger to the Apollo program. B 10-1

3. Longitudinal-Lateral Coupling on AS-502: Many questions have arisen with respect to the interpretation of the results of our simulation study of the longitudinal-lateral coupling observed on AS-502. We would welcome the opportunity of giving you a detailed presentation of our simulation results with appropriate interpretation. The presentation, with questions, would take approximately one hour. B

B 10-11

NOTES 10/7/68 BALCH

10/7952

MISSION:

S-II-5 - Modifications to stage are still in progress. Removal from the Vertical Checkout Building and reinstallation in the A-1 Test Stand is now scheduled for 10/11/68. ✓

S-II-6 - Full-duration static firing was successfully accomplished on 10/3/68. There were no major problems during countdown. Data evaluation is in progress. Stage is scheduled to be removed from the test stand and installed in the Vertical Checkout Building for modifications on 10/15/68. It is to be returned to the test stand for completion of post-static checkout about mid-November. ✓

S-IC-7 - "Power-up" was accomplished on 10/2/68. POGO modifications and modifications in the lower ring baffle in the LOX tank have been completed. Static firing is still scheduled for 10/23/68. ✓

INSTALLATION:

BOMEX - Contract for BOMEX data management services was awarded to GE MTSD on Friday, 10/4/68. ✓

University Research - Meetings were held at MSFC on 10/1/68 and 10/2/68 as planned to discuss specific research projects to be undertaken by Louisiana State and Mississippi State Universities at MTF. ✓

Personnel from the University Science Center for Liquefied Natural Gas Services, Pittsburg, Pennsylvania, visited MTF and discussed their intentions of submitting an unsolicited proposal for conducting combustion tests and ram jet studies at MTF using liquefied natural gas. They indicated that they had chosen MTF because they were familiar with its capabilities. Some of the visiting personnel were ex-employees of GE MTSD. Their present plans are to submit their proposal to MSFC for review and consideration the latter part of October or first part of November. ✓

GENERAL:

Public Affairs - NASA tenth anniversary was observed at MTF on Sunday, 10/6/68, with a "Family Day" open house from 12:00 noon to 5:00 p.m. ✓

Students from the University of West Berlin witnessed the static firing of the S-II-6 on 10/3/68 and were given a tour of the site on 10/4/68. ✓

B 10-11

NOTES 10/7/68 BELEW

10/7/95B

STATUS OF LM, AIRLOCK AND HABITABILITY TRANSFERS: A meeting was held with the MSC AAP Program Office on Monday, September 30, 1968, to discuss the schedule for transfer of Airlock and LM contracts. A basic plan was agreed to and the specific status of activities is as follows:

Airlock - Three sessions are planned among MSC, MSFC and MDC over the next several weeks to review the current Airlock contract scope of work and the outstanding change proposals. The first in the series of meetings will be held at MSC this week. In addition, an in-depth technical presentation of all Airlock systems by MDC to MSFC is planned for late October. Target date for transfer of the Airlock contract and technical direction to MSFC is December 1, 1968.

Habitability Systems - A planning meeting was held at MSC on October 3, 1968, to discuss transfer of these systems to MSFC. MSC will transmit to MSFC, by October 18, 1968, habitability systems' requirements which have been generated to date. MSFC will evaluate these requirements and, after appropriate coordination with MSC, will prepare a scope of work for contractual implementation. We plan to incorporate this effort into the MDC contract.

LM - The LM Modifications Preliminary Design Review (PDR) is being held at Grumman (GAEC) this week, with MSFC participation in each technical and Program area. The current GAEC contract on LM modifications expires on October 15, 1968. On October 4, 1968, Dr. Paine approved a plan which will permit MSFC to let a follow-on LM contract with GAEC, effective October 16, 1968. He approved the issuance of a letter contract with a ceiling which will permit GAEC manpower build up from the current level of 400 to 600 by June 30, 1969. The level should permit a Critical Design Review by the end of December 1969. During this meeting on October 3, 1968, Dr. Paine indicated he wanted all contracts definitized as soon as possible. This includes the LM, Airlock, Workshop and Payload Integration contracts. Up to this date, we have never had authority to definitize major contracts; therefore, I feel this decision is quite significant in that we now have NASA authority to proceed with the Program.

B 10-11

NOTES 10-7-68 BROWN

10/7/68

H-1 Engine - Subsequent to discussions with Mr. Hueter and General O'Connor on September 17 and with you on September 18, all H-1 engine system and component testing at Rocketdyne has been stopped (as of September 23). Also, corresponding personnel reductions are being effected.

Efforts to isolate the origin of the cap screw which went through the pump on engine H-7077 (position no. 1 on SA-207) have not yet yielded results. The studies are continuing.

J-2 Engine - Reference my notes of 9/30/68 concerning the helium regulator failure on AS-205. Investigations are continuing. No definite cause for the failure has been identified. The failure occurred in the Mylar diaphragm of the vernier regulator (one of three diaphragms in the regulator assembly). The vernier regulator provides a fine control for the main regulator diaphragm. The primary emphasis has been placed on duplicating the failure. However, the results to date are inconclusive. The analysis is being conducted on a 24-hour-a-day basis in an effort to establish the cause prior to the launch of AS-205. At this time no launch constraint is warranted.

A successful acceptance test of S-II-506 was accomplished at MTF on October 3. The firing was for 372 seconds duration. All engine parameters and hardware appeared normal.

Due to the urgency of negotiating the follow-on production support effort (present contract ends 12-31-68), a TWX depicting the proposed prenegotiation position has been forwarded to NASA Headquarters for approval. We hope the TWX will be accepted in lieu of a presentation at Headquarters, thereby accelerating the start of negotiations.

CONSTAN NOTES 10/7/68

B 10-11

10/7 95

VISITORS TO MICHOUD

On Thursday, October 3, 1968, twenty students of Technical University of Berlin were given a briefing and tour of the facility.

On Friday, October 4, 1968, Dr. W. Langer, Chairman of the Board, and Messrs. Helmut pierschke and Gunter Storjohans of Volkswagen International, accompanied by Mayor Victor Schiro and Mr. Willard Robertson, local distribution of Volkswagen, were given a briefing and tour of Michoud.

NOTES 10/7/68 GEISSLER

10/7/68

B 10-11

1. Joint MSFC-ESSA Meteorological Experiment: The Wave Propagation Laboratory, ESSA, Boulder, Colorado, and the Marshall Space Flight Center entered into a joint venture in April 1968, to explore the potential of infrared crossed-beam techniques for micrometeorological studies of mean winds, water vapor fluxes and turbulence near the earth's surface. ESSA is matching funds with us through sharing the costs of equipment purchases, providing a meteorological tower with advanced humidity and wind sensors, obtaining the required meteorological measurements and developing the extensive computer program required for predicting the transmission of infrared light through a humid atmosphere. After a period of only six months the program has already created unique instrumentation (infrared crossed-beam system) unique recording equipment (on-line digital recording and computations), interface electronics (time code generator and reader for generation of phase matched multi-channel digital tapes for MSFC's UNIVAC 1108 computer) and software programming (extension of MSFC's unique piecewise correlation program to multi-channel operation). The ESSA prime investigator, Dr. Bradford Bean, has been asked by Dr. Ben Davidson, Office of the Director, ESSA, to build humidity sensors for the aircraft that are being flown during the BOMEX program. A feasibility study of passive crossed-beam detection payloads for future global weather observations is recommended in ESSA's five year project guide. ✓✓

E.G. Your patience and perseverance seems to be bearing fruit. Congrats. to all concerned, B

2. Jet Plume Analysis: Representatives of our Aerophysics Division were contacted recently by MSC personnel concerning the critical problems caused by impingement of the plume from the R4D nozzle on the LM. MSC asked us to analyze this plume for them, and we agree to do so. Results of the calculations will also be applicable to ATM plume impingement phenomena. MSC asked us to do this job because our computer programs can handle vitally important technical aspects of the problem that currently cannot be handled by their less sophisticated jet plume analysis computer programs. ✓

E.G. I hope you are also looking into the plume impingement problems of AAP, in particular ATM B

3. Design Reference Mission Document: With support of the System Integration Contractor, Martin/Denver, we have developed a "Design Reference Mission Document" (DRMD) for the AAP Cluster Mission. It has been published in 6 volumes: a. Mission Description, b. Detail Orbit Trajectory, c. Design Engineering Integrated Mission Timeline, d. Attitude Mission Timeline, e. Integrated Mission Systems Descriptions and Requirements, and f. Alternate Mission Plans and Contingency Planning. To solve questions about responsibility areas and to reduce duplication, and in view of MSFC's responsibility for the AAP Baseline Reference Mission (BRM), a tentative agreement, subject to ratification by the steering committee (representatives of the MSFC design labs), was reached that Volume 1 of our DRMD would essentially become the Marshall input to the Houston published BRM, which will be co-signed by both Centers. The other 5 volumes will be published by Marshall as "Working Papers" for use by interested groups of all Centers and Headquarters. The title DRMD will be eliminated to avoid misinterpretation of the character of the report. The Martin input will be redirected accordingly. ✓

Ex

NOTES 10-7-68 GRAU

B 10-11

10/7 RD

1. H-1 ENGINE PROGRAM: Due to curtailment of H-1 engine production and testing activities at Canoga Park, H-2039 (the age study engine) will be processed at MSFC. The engine will receive a second E&M checkout, flight duration hot-fire test, and subsequent disassembly and inspection of age controlled items. No schedule has been established, but agreement has been reached for participation by R-QUAL, R-TEST, and R-P&VE. ✓

2. S-IC PROGRAM: S-IC-5 stage electrical cable installations were evaluated to determine the effectiveness of recurrence control action taken by The Boeing Company following the October 1967 S-IC-3 inspection. While improvement was evident, several conditions deemed unsatisfactory were still evident. Most evident was the excessive use of tape for cable support, excess cable lengths, and routing of cables over sharp or abrasive edges. The Boeing Company stated that they are going to reinspect and re-evaluate the conditions found and notify the S-IC stage manager of the corrective action that will be taken. ✓

3. S-IB PROGRAM: Reject rate for bench component testing over the past year averages 3% as compared to much higher rates on other programs. ✓

4. S-II PROGRAM: Discovery of cracked solder joints and various other defects in time division multiplexer printed circuit assemblies has resulted in a decision to examine identical printed circuit assemblies installed on S-II-503. Flight spares will be reworked or repaired per direction of the solder committee by the supplier (Teledyne/ Lewisburg, Tennessee). Defective printed circuit assemblies found on S-II-503 will be replaced with the reworked/repaired units. ✓

NOTES 10/7/68 HAEUSSERMANN

10/7 9:05

B 10-11

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noted BH 10/21

3. Personnel Achievement. James W. Steincamp, who is with us in a graduate student space and of our Advanced Studies Office, received his Ph.D. in mathematics from the University of Alabama at the end of August. ✓

B
10-11

NOTES 10/7/68 HEIMBURG

10/8 9 TS

S-II TEST PROGRAM (MSFC) (STRUCTURAL) The S-II (V7-21) Structural Test, Phase VIIA, limit and ultimate prelaunch load interval sequence was partially completed on 10/4. The test was terminated at the load sequence of a -22.5 p.s.i.d. (differential) collapse pressure on the stage common bulkhead. Maximum intended collapse pressure test level was -27 p.s.i.d. During previous tests, this bulkhead had been taken to -21.1 p.s.i.d. 7 times under ambient and 4 times under cryogenic conditions. ✓

K.H. Did it collapse at -22.5 psid? How critical is that? It would be less than expected, correct? B

ACCESS ARM NO. 9 (AA-09-02) The AA-09-02 arm structure was delivered to the Test Area on 9/30; however, the hinges were not available from Boeing until 10/2. The arm structure, environmental chamber (EC), and hinges were assembled and installed on the Test Tower by 10/5. EC checkout and testing will begin on 10/7. The control console and accumulator rack, which are required for arm swing, will not be available from Boeing until 10/16. We are hoping to complete testing on this arm by 11/25, to meet present KSC on-dock date of 12/3. ✓

F-1 TURBOPUMP (POGO) Tests were conducted last week to determine the compliance factors for the inboard and the outboard fuel PVC ducts. These tests were run under no flow conditions and with the turbopump isolated from the fuel suction line. The fuel suction line, filled with fuel, was pulsed from 3-33 c.p.s. at suction line pressures of 16 to 48 p.s.i.g. Both inboard and outboard configurations were tested. Test data are being evaluated jointly with P&VE. ✓

F-1 ENGINE Tests FW-103 and FW-104 were conducted on the West Area F-1 Test Stand on 9/30, with F-1 engine S/N F-2009-1. The primary test objectives were to verify the fuel system transfer functions and fuel duct resonant frequencies for POGO analysis. ✓

S-II-6 (MTF) A successful 72 seconds acceptance static firing was conducted on S-II-6 on 10/3. A lox low level (2% sensor) manual cutoff was given. No anomalies were noted as a result of removal of the lox sump baffles. At 45 seconds engine No. 4 P_c shifted down 17-18 p.s.i. for the remainder of the test. Engine No. 5 shifted up 7-8 p.s.i. at 75 seconds after start for the duration. The LH_2 vent valves microswitches malfunctioned during the firing.

45 sec? 2?

B 10-11

NOTES 10-07-68 HOELZER

10/7 9AS

SOFTWARE DEVELOPMENT FOR 504 TEST IN R-P&VE: A new Structural Test and Checkout software system (STAC) has been developed in cooperation with Propulsion and Vehicle Engineering Laboratory to acquire and compute raw strain on the SII-402 cryogenic proof pressure tests. To overcome some of the instrumentation non-linearity problems, the Advanced Structures North American Rockwell Corporation, Los Angeles Division (LAD) computer program has been successfully implemented September 27, 1968, under Executive II UNIVAC 1108 system. When converting strain to stress, program is capable of correcting for temperature, anisotrophy and plasticity effects in cryogenics region. The program will process a large number of channels as well as present the digested data in a good report format.

NOTES 10-7-68 JAMES

10/7 9 AS

3 10-11

1. AS-503: With erection of CSM-103 expected on October 8, AS-503 roll-out is now anticipated on October 10, 1968.

2. S-II-6: The static firing of the S-II-6 was successfully completed on October 3, 1968.

3. AS-504 at KSC: With the delivery of S-IC-4 and S-IU-504 to KSC on September 30, 1968, all AS-504 vehicle stages are now at the Cape. S-IC-4 was erected on the LUT on October 1, 1968.

4. AS-504 Software: AS-504 SLCC update and AS-504 Vehicle Test Program were delivered to KSC on October 2, 1968. This was the schedule we had established with KSC.

5. Soft Shutdown for F-1 Engine: Since there is still uncertainty at the spacecraft structural interface in regard to engine-out at high-Q, confidence tests have been run and kits have been made available if needed. Kits can be on-dock KSC October 22, 1968, for AS-503. MSC does not favor kit installation. Final decision will be at the Washington level.

6. Vehicle Performance Capability: A study similar to the IB performance capability has been completed on Saturn V and reveals a capability beyond our present commitment. This study is based on actual engine performance data, actual hardware weights and the results of the AS-501 and AS-502 flight data. This subject will be covered in some detail in the MCM on October 8, 1968.

7. Saturn V Breadboard: The Saturn V Breadboard will be required to support C' and D mission changes during the AS-503 CDDT and launch countdowns. The Breadboard had previously been retained in the launch configuration in the event that real time support to KSC was required. We do not expect a need for this support on AS-503, but could re-configure in 32 hours if a serious problem occurred.

NOTES 10/7/68 JOHNSON

10/7/68

B 10-11

Bill J. Could you send me a 1-page "popular science" excerpt on the gist of this Gravity Substitute Workbench Experiment? Thanx B

Gravity Substitute Workbench Experiments - Questions raised by Maj. Gen. Stewart, the A.F. representative on the Manned Space Flight Experiment Board, concerning the objectives, experiment protocol, safety aspects, etc., of the Gravity Substitute Workbench Experiment have now been submitted to the Center. Mr. Tom Fox (ME Lab) and Mr. Oscar Holderer (Aero) are preparing answers. Except for what appears to be a basic tenet that the provision of such supporting equipments may negate the necessity for the Astronauts to acquire the skills required to perform such tasks unaided in Zero "g", the questions are valid. Aside from being able to completely confirm our approaches to "man-rating" the equipments, they require in answer straightforward documentation of information already available. We anticipate no problems in providing acceptable responses to all the questions.

In the MSFEB, Dr. Mueller fully supported and endorsed proceeding with this experiment, even if its inclusion in the workshop required deletion of an already approved experiment. ✓

Effects of Sub-Orbital Trajectories of S-IVB-IU on Passenger Experiments - Decisions appear to have been reached to fly the AS-206 (AAP-I) in a mode such that the S-IVB-IU does not attain orbit. The plan was to fly a P&VE Experiment to measure effects of contaminants on thermal control coatings and the University of Wisconsin Galactic X-ray Experiment as passengers in the IU on this flight. The value of both experiments depends upon the active lifetime of the IU in orbit. Up to several hours is required for good results. The second flight (back-up) of the University of Wisconsin Experiment is planned for AAP-3A flight, for which it also now appears that a sub-orbital trajectory of the IU is being planned. Prof. Kraushaar and the University of Wisconsin Group now have four years invested in the experiment -- which is OSSA sponsored. We will try to work out with the AAP Office alternatives which will permit flying the experiment; but there are few alternatives available. Some consideration may be required of the fact that Bill Kraushaar, because of his past very pleasant and productive relations with center personnel during the early Explorer days, has been one of the few voices in the "science community" that has consistently supported MSFC as an organization capable of working with and for the individual scientist.

Lee Below

Has this commitment to Bill Kraushaar (indeed a faithful supporter) overlooked when the mission profile was changed? What do you propose to do? I think we shouldn't simply pull the rug from under him! B

NOTES 10-7-68 KUERS

B 10-11

10/7/68

1. S-II (TITAN) CONTAINER BACK-UP PROGRAM: This program was initiated approximately a year ago for the purpose of evaluating the welding techniques for the S-II LH_2 girth weld which joins the upper bulkhead to cylinder #6. The use of sample panels for evaluation of a welding technique and for comparison of different welding methods never provides for a full and true evaluation of actual hardware quality. The degree of perfection obtainable on the actual, full-size hardware is dependent on many factors, such as alignment, tooling, duration of welding, etc., for which small sample panels are not truly representative. In order to provide for a more thorough and realistic evaluation of welding techniques for the S-II LH_2 tank, we have established a program of testing a number of 10 ft. diameter containers under LH_2 cryogenic conditions. The containers consist of two Titan bulkheads (obtained from the Martin Company as excess hardware) and a cylindrical section manufactured in-house. The circumferential welds of these containers are of the same configuration and gage thickness and will be exposed to the similar stresses as in the S-II LH_2 container. Each container will have one circumferential weld made by the TIG welding process and one weld produced by the Pulsed Arc MIG process. Both welds will always be exposed to the same test conditions and cycles and will experience identical life histories. The welding of the first S-II (Titan) tank was completed last week and is now being inspected. Instrumentation and insulation will be added after hydrostatic testing. The cryogenic tests will be conducted by Test Laboratory after completion of the S-II Mini-Tank tests. ✓

2. NEUTRAL BUOYANCY SIMULATOR ACTIVITY: AAP hardware testing was suspended again last week due to slides in the delivery schedules for the test articles. The forward dome hatch was received and is being installed. Because of the general schedule slides in AAP and also because of design changes for test hardware, we cannot conduct many tests as scheduled. However, a peak load seems now to occur in December this year. ✓

NOTES 10-7-68 LUCAS

B 10-11

10/7/68

1. S-II - "C" STRUCTURE: NASA Headquarters has recommended that the "C" structure testing be terminated. (a) The structure has been qualified for all required ultimate test conditions (130%) except the one-engine-out case with heat (Condition IV-3). (b) Evaluation of data from Condition IV-3 does not reveal any reason for the failure at 122%. (c) There is evidence of some deterioration of the structure's capability because of excessive yielding and residual stresses in the primary structural elements from the numerous failures and corresponding repeated test loadings experienced. We have recommended acceptance of the presently established flight qualification levels. Acceptance of the 122% level for Condition IV-3 in lieu of the required 130% is deemed practical since this is a malfunction (failure) condition. However, to provide additional alternate mission capability, a two-engine-out test is planned for the "C" structure to assure structural integrity for that condition. Loading would be restricted to prove a safety factor of 1.0 with engines number 2 and 3 out, considering the thermal environment consistent with two engines out. Subsequently, an additional influence coefficient diagnostic test will be accomplished to compare with the original influence test and assess the effects of the total program on the specimen. This information may help to explain the failure that occurred during test condition IV-3.

2. SHORT STACK TEST: Wyle completed successfully the 505 cutoff condition at 130% level with heat at 2:30 a.m. 10-4-68. Wyle is setting up for the integrated static dynamic load test, which will be run hopefully today or tomorrow.

3. S-II STAGE, J-2 ENGINE VIBRATION: To verify the vibration and acoustic environment (IN-P&VE-S-63-2) in the engine area, we had three vibration measurements installed on each J-2 engine in AS-501 and 502. We need these data to properly qualify components located in this area (ASI lines, etc.). No valid vibration data were obtained on these flights due to instrumentation problems. Telemetry system amplifiers apparently were saturated, probably due to high amplitude, high frequency data in the signal to the amplifiers. Filters were to have been installed in the signal conditioning amplifiers, but due to time limitations, corrections could not be made prior to AS-502 flight. When the AS-502 anomalies occurred, basic agreement was reached with stage and engine contractors on corrections and additions to the Instrumentation system and measuring ranges. After installation of some compromise instrumentation on S-II-5 and evaluation of the static firing data, we concluded that unless the ranges are changed to improve the signal to noise ratio of the system, the probability of losing most of the J-2 engine data is high again. General Phillips has disapproved these changes for AS-503 and is holding up the incorporation of the changes into AS-504 and 505 until after the AS-503 flight. Unless every effort is made to immediately implement these changes for AS-504 and 505, time limitations will probably again prevent their implementation.

RUSH

BL. Here it is again: Waiting for some failure history! I'm ready to buck the decision for 504/05. If you concur please draft a suitable polite but strong letter to Phillips for my signature (Refer to my previous gripes in this matter)

B 10-11

4. S-II STAGE PNEUMATIC CONSOLE: The S-II stage pneumatic console, S7-41, malfunctioned during checkout operations 10-1-68. This was caused by only a partial incorporation of an ECP, which increased the outlet pressure of the roughing regulator but did not increase the relief valve setting. Consequently, the relief valves opened and did not reseat until the console supply pressure was cut off. Also, a portion of the common vent system had been opened and capped off causing overpressure on some systems; however, no damage occurred. The relief valves have now been properly set, and the console is back on line.

H.M.
Please prepare, jointly with Leland Belew, a briefing on our 68 thru 71 fund-phasing plan for AAP. It should include funding of Martin, Grumman, MacDonnell, and the comparative funding plan of MSC for the 28 and 50-day CSM's.
B
suggest a 1 hr briefing

NOTES 10/7/68 MAUS

10/7/68

B 10-11

FINAL MSF POP 68-2 SUBMISSION - The Center Review of the final MSF POP 68-2 was held October 4, 1968. Obligations plans are as follow:

	FY-68	FY-69	FY-70	FY-71
Apollo	$ 975.7	$575.8	$496.7	$338.1
AAP	142.0	71.5	162.0	182.0
Sup. Dev.	16.7	6.0	7.0	20.0
Adv. Missions	-0-	-0-	4.0	9.0
MSFC Total (In Millions)	$1,134.4	$653.3	$678.7	$549.1

H.M. Total FY69 Authorization is 253.2 M. Interim Operating Plan is 150.0 M. Not does this jibe with an official plan for MSFC of only 71.5M ? B

The obligation plans are within MSF controls with the exception of the Apollo Application Program which exceeds the FY-70 control by $39.6M. MSF provided Apollo cost targets of $693.8 in FY-69 and $511.6 in FY-70 which were exceeded by $19.9M in FY-69 and underran by $0.4M in FY-70. Based on the first 3 months cost rate for FY-69, our projected FY-69 cost will be approximately $695M, which is very close to the MSF target. Verbal guidance received subsequent to MSF guidelines instructed MSFC to add $50M in our Apollo Saturn V plan and to increase Saturn IB by $1M in FY-69 and $16M in FY-70 for an MSF reserve.

FY-70 MANPOWER AUTHORIZATION - We have been advised that NASA is planning to discuss with the Bureau of the Budget a FY-70 Budget Plan of $4.1 and $3.6 billion. The manpower impact on Marshall of these Budget Plans is summarized below:

	FY-69	FY-70	
	Ceiling	$3.6B Plan	$4.1B Plan
MANPOWER (EOY)	5981	5535	5851
		△=446(1	
			△=130(2

(1 Under the MSF Plan, a reduction of this magnitude would be accomplished by a RIF in the second half of FY-70.

(2 Could be attained through attrition

What's plan C"?

FY-70 BUDGET PLAN "C" - We learned this morning from MSF that Dr. Mueller has decided to submit a Plan "C" Budget for FY-70 for MSF. Earlier plans had been directed toward an MSF submission keyed to a $4.1B agency level. No additional information is as yet available.

NOTES 10-7-68 MOHLERE

10/7 NB

B 10-11

No submission this week.

NOTES 10/7/68 MURPHY
10/7/68

B 10-11

SNAP 27 SAFETY REVIEW:

A SNAP (Systems for Nuclear Auxiliary Power) 27 isotope fueled thermoelectric power system for the ALSEP (Apollo Lunar Surface Experiments Package) is currently undergoing an interagency (DOD, AEC, NASA) Safety Review. General Electric is the manufacturer of SNAP 27, under an AEC contract, and has generated the safety documentation for review. NASA, as the user agency, is responsible for mission safety. DOD is responsible for range safety and the AEC provides the nuclear source.

The Safety Review is being conducted by an Interagency Safety Review Panel and each agency has appointed a panel coordinator as its principal representative. Tom Kerr (OART) is the NASA Panel Coordinator. MSFC membership on the panel is Scott Fellows. The Panel has established five working groups: Range Safety, Reentry, Meteorological, Oceanographic, and Biomedical. MSFC is represented on the first three groups.

The Safety Review is scheduled to be completed and a report given to the National Aeronautics and Space Council for mission approval before the end of this year. The Safety Review schedule has not been changed, even though the ALSEP package will not be flown on the first lunar landing. Thus far, the MSFC people have noted some interesting areas of safety concern during the course of the review.

If you desire, I will arrange an informal briefing by the MSFC people involved to appraise you of the safety problems.

→ Yes, but let's do it only after the review has produced the complete picture

B

noted. BK 10/8/68

NOTES 10/7/68 RICHARD

10/7/68

No submission this week.

B 10-11

NOTES 10/7/68 SPEER

B 10-11

10/7/68A

1. AS-205 NPSH Flight Mission Rule: During the Flight Readiness Review we presented to Gen. Phillips the MSFC position on recommending S/C abort from the ground after reaching the minimum allowable S-IVB NPSH of 100 ft. Gen. Phillips overruled our recommendation for the following reasons: (1) data processing time delay at Houston; (2) lack of test data; (3) uncertainty of ultimate consequences; and (4) low criticality of failure ($65 \cdot 10^{-6}$). MSFC has agreed and this mission rule is being rewritten that no action will be taken for low NPSH.

E.S. If I remember, Rocketdyne's Kasteuhalz said J-2 could explode if NSPH drops below 100 ft. What's our reaction to that statement? B

2. MSFC Inflight Support for C' Mission: We have assessed jointly with the Saturn V Program Office and R&DO the feasibility of HOSC inflight computer support which can be provided to MSC for the C' mission in giving a go - no go recommendation for S-IVB second burn and translunar injection. Since the available time for preparation is extremely short, a completely satisfactory program with backup computation would lead to unacceptable impact on ongoing mission preparations (AERO primarily affected). Therefore, it was agreed to provide a minimum type of trajectory analysis utilizing actual propellant mass histories; however, without the benefit of training simulations. We are planning to brief you on the options for subsequent missions in the next Board Meeting or at your convenience.

3. AS-205 Flight Data Delivery: L/V recorded data from KSC, Bermuda, Texas, Hawaii, Australia and the Apollo aircraft will be expedited to provide immediate feedback for the Apollo 8 mission decision.

4. LIEF Conference Room: Effective immediately and due to reduction in contractor personnel supporting the Management Services Office this large MSFC conference facility will have to be restricted to Apollo mission related conferences and operations support.

B 10-11

NOTES 10-7-68 Stuhlinger

10/9

1. METEOROID PHYSICS: OART will hold a Meteoroid Impact and Penetration Workshop at MSC on October 8 and 9. A large number of presentations will be given on simulation of meteoroids, impact physics, meteoroid protection, and meteoroid impact sensing. Speakers from MSFC will be R. C. Ruff from P&VE, and P. N. Espy and D. W. Jex from SSL.

2. BALLOON FLIGHT EXPERIMENT: Our third flight of an ORNL-developed, SSL-prepared gamma ray flight experiment with a balloon launched from Palestine, Texas, is scheduled for Monday night, October 7. Flight preparations have gone very well so far. We hope for a 10 to 12 hour flight.

3. APOLLO SOIL MECHANICS STUDIES: Dr. Costes of SSL was requested to submit to the Lunar Exploration Office of NASA Headquarters pertinent information on the lunar surface soil mechanics investigations, to be performed during early Apollo landings, which he and Professor Mitchell of the University of California, Berkley, have prepared at the request of Dr. E. M. Shoemaker, Principal Investigator of the Apollo Lunar Geology Experiment. This information is needed by the Contingency Science Working Group which was set up mainly as a result of the decision to exclude the ALSEP mission during the first lunar landing.

4. SOLIDIFICATION RESEARCH: A paper on solidification research by Tom Bannister has been accepted for the AIAA 7th Aerospace Science Meeting, January 20-22, 1969. This research is being conducted in connection with the development of phase change radiation coolers which use solidifying coolants and keep their temperatures almost constant over wide ranges of heat rejection.

5. JOINT SSL-USARP PROJECT: Phil Smith from USARP arranged for a young meteorologist from Austria, who is working toward his Ph. D. at a Naval research station under an NSF scholarship, Michael Kuhn, to visit our IR Laboratory. Mr. Kuhn spent the last Antarctic winter at Plateau Station. He will go again for a second tour as part of his work for the NSF Antarctic program. After a day's discussion at SSL, a proposal had been worked out which would have a good potential for success: (a) An IR instrument suitable for IR measurements of the Antarctic atmosphere will be built in our lab from existing parts; (b) the amount of precipitable water and its angular dependence will be measured by hand pointing the instrument to the sun. The IR will be measured as a function of the wavelength. The water contents will be derived from three discrete wavelengths; (c) with his background in meteorology and with the simultaneous measurement of radiation parameters in the visible portion of the solar spectrum, Mr. Kuhn will have a good chance to publish the results and make a significant contribution to the literature on Antarctica which simultaneously should be of interest to astronomers for potential use of Antarctica as a site.

Bill Lucas Do you know about these things? Sounds interesting B

Uh!

In the Winter How? B

3 10-11

NOTES 10/7/68 TEIR

10/9 TEIR

SA-205 STATUS: No serious problems have developed with either the launch vehicle or spacecraft since the AS-205 FRR last Thursday. Launch is still scheduled for Friday, October 11, with the window extending from 11:00 AM to 4:00 PM EDT (10:00 AM to 3:00 PM CDT).

We had a minor problem last Friday during the S-IVB APS hypergol loading. The fuel fill and drain valve on one of the modules developed a slow leak just as hypergol loading was being completed. After coordinating completely with MDAC and P&VE we made the decision to not changeout the valve, but to drain completely, fill again, and cap off the fill line with the flight cap. Even though the valve leaks and allows the fill line to go to the same pressure as the tanks (200 psia) we will have no problem. The line has been proof tested to 550 psig with the rest of the module, and the valve will open back into the module with a ΔP of 10 psi to relieve the line pressure buildup.

SATURN IB PHASEDOWN: Even though we have not received a decision from NASA Headquarters on the SA-276 dual launch mission, we are initiating initial contract action with our contractors (CCSD, MDAC, and IBM) to start the manpower phasedown on October 15 or as early thereafter as possible. By taking actions such as this, we expect to reduce our FY-69 costs by about $3. M below our MSFC Cost Reduction Study figures.

B 10-11

NOTES 10/7/68 WILLIAMS

10/7 9:15

F.W. Very interesting Sounds o.k. B

1. Nuclear Program: Ron Harris briefed key Space Sciences Laboratory (SSL) personnel 10/1/68 on the status of the nuclear rocket program and the OSSA study to consider a functional/operational payload for the first nuclear vehicle flight test. The SSL people were especially interested in the possible flight test missions because of their studies and interest in an asteroid belt Pegasus, one of the missions which will be considered in the OSSA study. The briefing was attended by Dr. Stuhlinger, Messrs. Downey, Dudley, Stern, and several other SSL personnel.

2. Lunar Landing Stage Study: We received a TWX from NASA Hdqts. (Milwitzky) advising that funding for the Intermediate Lunar Landing Spacecraft is available. A preliminary draft of the work statement was submitted to Milwitzky on 10/2 for his comments and recommendations. Unless there is a significant problem, the work statement should be available to P&C for processing no later than 12/1. Each action further commits the Center to a potential long term obligation. I am concerned about the desirability of MSFC participation in this area and will discuss it at the next FPPB meeting.

3. Integral Launch and Reentry Vehicle Study (stage and one-half to orbit): These studies (MSC and MSFC) for $300K each were approved. We are working on a procurement package and getting funds ready.

4. OSSA Launch Vehicle Studies: Joe McGolrick, Launch Vehicle & Propulsion Programs, called to say the S-IVB/Centaur Integration Study is still alive and that the proposed funding has been increased from $150K to $200K. This study would complement the existing study with Boeing on the S-IC/S-IV vehicle.

5. National Space Booster Study: Chrysler presented results of "Saturn Vehicle Costs" to MSF on 10/2. Attendees included Dr. Rees, Mr. Hueter/Andressen/others from I.O.; Luke Spears/Milt Page - ASO; Bob Hock - KSC; C. Mathews and Dr. Mueller (part time), and Saturn stage contractors. Dr. Rees was to attend the 10/3 briefing to Mr. Webb/Dr. Paine. We have copies of Saturn cost data presented by CCSD, including proposed means of reducing costs. Titan III cost data were not included. There are still unofficial indications that the CCSD study will proceed in Phase II as originally planned, with $500K - $1M additional funding. Headquarters has indicated it will want Center participation in Phase II, but have not had a chance to plan or discuss arrangements.

6. Space Laboratory Logistics Alternatives: As a result of meetings in Washington with C. Donlan, MSC, and LaRC on 10/1/68 (Becker, Spears attended), Hdqts. (Advanced Manned Missions) has action to prepare a briefing for 10/10/68 Management Council meeting on logistics alternatives for the Earth Orbital Space Lab (EOSL). Alternatives will include possible new launch vehicles and "Tip-Tank" type concepts. We are providing inputs to Headquarters. The review from various centers requested of Donlan by Dr. Mueller was not discussed at the 10/1 meeting, and this series of briefings will probably not be firmed up until after the Management Council meeting, which it is hoped will recommend alternatives appropriate for initial EOSL operations (~1975). Now that we have discussed the EOSL and related logistics systems plans with you (Friday - Oct. 4), we are taking action to have C. Mathews visit you and discuss his views, plans, etc., at a time mutually convenient (we are working with Bonnie on this).

October 11, 1968

OFFICE OF DIRECTOR – MSFC

CODE	NAME	INIT.	☐ ACTION	☐ INFORMATION
	Dr. von Braun			
	cy to Lucas + Belew 11-13			
	Weidner + Murphy 11-14			

REMARKS

Lee Belew and Bill Lucas would like to get your opinion on how they should pursue this matter of different specifications. We can do one of the following:

a. Accept the Headquarters-issued Houston specification (this is considered unsatisfactory). Shep Please tell them.

b. Hold out strongly for our spec. Yes, but

It would appear that we should take course b. above and try to get Headquarters to negotiate a position between our spec and Houston's spec which would permit the utilization of our specification on the Workshop and not disturb the Houston spec on the Apollo program.

I suggest the following approach: In our disagreement with the MSC spec, let us avoid any language which questions the safety of the Apollo hardware. But take the position that OWL is second generation hardware, and a new start that permits superior solutions all the way thru. ("You don't use DC-3 specs in the jet age.") This position doesn't question the safety of the DC-3. Bill

CODE	NAME	DATE
DIR	J. T. Shepherd	11-8-68

MSFC - Form 495 (Rev August 1963)

NOTES 10-14-68 LUCAS

1. "A" STRUCTURE: The pre-launch test condition run, simulating pressurization or venting system failures, was started 10-4-68. The LOX tank burst mode on the common bulkhead with the planned 1.2 factor of safety was successfully achieved. However, at the limit collapse mode pressure (reverse pressure on the common bulkhead) reverses in gage polarity and nonlinear characteristics were noticed at 1.0 safety factor. The test was terminated immediately to allow ultrasonic inspection of the bulkhead for debond areas and check of the instrumentation. To date, it is not clear whether there are debond areas of the facing sheet. The instrumentation checks satisfactorily. It is encouraging that the common bulkhead, during the current testing program had withstood 90 burst limit pressure cycles (56 cycles at room temperature and 34 cycles at cryogenic temperature) and 11 collapse limit pressure cycles (7 cycles at room temperature and 4 at cryogenic temperature) before the last sequence. During the prelaunch test condition, the common bulkhead was subjected, for the first time, to a bursting type pressure higher than limit. After the inspection is completed, we will determine the advisability of continuing the test program for the S-IC flight cutoff condition and the design ultimate test neither of which require a reverse pressure on the common bulkhead.

2. SATURN IB WORKSHOP FLAMMABILITY: In my notes of 4-22-68, and 5-13-68, I referred to a developing problem in AAP flammability control. AAP Program Directive #16 issued in spite of objections generated by us and forwarded to Headquarters by Lee Belew makes the MSC document controlling for AAP. The Apollo CM and LM, built to an earlier version of this MSC document, failed dramatically when ignited in a 95% O_2 environment. These failures prompted the ground environment changes now used, air in LM, 60% N_2 40% O_2 in CM. As examples of our disagreement with the MSC document, it permits the use of materials which, when ignited in 1g, burn down at a rate of 18 in. per minute. FAA, for example, will not permit installed materials in commercial aircraft which, under the same conditions, burn at a rate in excess of 4 in. per minute. Secondly, the MSC design philosophy is to separate flammable materials with a "fire break" composed of either nonflammable materials or materials which are self-extinguishing. It has been demonstrated by the CM and LM tests that "fire breaks" composed of self-extinguishing materials are unsatisfactory. Our design approach is to eliminate flammable materials or, where such materials must be used, minimize the quantity and carefully isolate these from each other. Our approach is obviously more difficult but so far we have kept flammable materials out of the basic OWS. If we press our point we may jeopardize the main stream Apollo hardware by going on record as questioning the safety of that hardware. We are faced with the following dilemma: accept the inadequate MSC criteria, and face a potential catastrophy as a full partner, or insist that our more stringent criteria govern MSFC's portion of the AAP program. Your guidance is requested.

3. ORBITAL WORKSHOP FANS: The combined ventilation and acoustic test was accomplished in the mockup. With all 17 fans and the 24 in. fiberglass mufflers attached, the speech interference level was measured to be 49 db, which is 6 db below the present criteria established by MSC. A comparable test with no mufflers yielded 73 db.

NOTES 10/11/68 BALCH

MISSION:

S-II-5 - Stage was removed from the Vertical Checkout Building and reinstalled in the A-1 Test Stand on 10/11/68 as planned. Removal of stage from the test stand is scheduled for 11/8/68.

S-II-6 - Stage systems gross leak checks have been completed. Current working plans call for removal of stage from the A-2 Test Stand and installation in the Vertical Checkout Building for modification on 10/16/68.

S-IC-7 - Static firing is still scheduled for 10/23/68. The only constraint at this time is the large amount of open work items which must be completed or dispositioned prior to the firing.

INSTALLATION:

BOMEX - Last week's Notes indicated that the BOMEX contract with GE had been signed. Please note, however, that this presumes that a fixed-price contract will evolve by 10/21/68, which is by no means certain. The negotiation on this subject is yet to take place, and the 5/1/69 operational date still is critical.

E-Layer Project - Preparations are underway for the transfer to MTF of the phase doppler network for this project which was assembled at MSFC. These preparations are being coordinated with R-AERO-YS.

GENERAL:

Public Affairs - There were approximately 3, 500 visitors at MTF for the "Family Day" open house which was held on Sunday, 10/6/68, to observe NASA's Tenth Anniversary.

Dr. Harry Ruppe and his deputy, Dr. E. Igenbergs, from West Germany, visited MTF on 10/9/68.

NOTES 10/14/68 BELEW

AAP-2/AIRLOCK MODULE TRANSFER: As a part of the AM transfer activities, MSFC personnel participated in "fact finding" sessions on the AM scope of work and proposed cost change proposals (CCP's) at MSC from October 7-10. Further planned activities include additional reviews during the week of October 21 and November 4, and a review of the plans and specifications the week of November 25. In addition, there is a week-long detail technical review planned for MSFC personnel the week of October 28 at MDAC, St. Louis. This will consist of both presentations by MDAC personnel and follow-on discussions to bring MSFC personnel up-to-speed on the status and configuration of the AM.

PRELIMINARY DESIGN REVIEW: The Preliminary Design Review for the AAP Lunar Module modifications was completed last week. Typical decisions which will be implemented concurrently with the transfer of management responsibilities to MSFC were: (1) full implementation of the unmanned rendezvous and docking capability with the accompanying deletion of manned flight control requirements; (2) simplification, rearrangement, and appropriate relocation of crew provisions, restraints, and controls in the LM crew compartment; (3) initiation of final studies directed toward a decision on the degree of flight hardware capabilities to be provided for a decoupled, LM/ATM/CSM and; (4) updating and revision of specifications and plans for the modifications program.

GRUMMAN AIRCRAFT ENGINEERING CORP. (GAEC) REPRESENTATIVE AT MSFC: Major General John Shinkle (Retired) U.S. Army, is now associated with GAEC and will be the corporate representative in Huntsville to interface with MSFC on the LM modifications activity. John expects to be in Huntsville to start setting up his office during the week of October 21.

LM MODIFICATIONS CONTRACT: Details of the LM modifications contract were negotiated with GAEC last week. A letter contract will be awarded by MSFC to GAEC this week for initiation of the program to deliver flight hardware starting in 1971. The contract will have a period of performance from October 16, 1968 to February 1973, with a letter contract period from October 16, 1968 to August 31, 1969. The program includes a Critical Design Review next year and delivery of a test article to MSFC in 1969, for combined structural testing with the ATM.

NOTES 10-14-68 BROWN

AS-205 FLIGHT - Preliminary data indicate that the H-1 and J-2 engines performed exceptionally well.

J-2 ENGINE - Reference my notes of 10-7-68 concerning the urgency of negotiating the follow-on production support effort. Initial response received from Headquarters (10-9-68) on the TWX, which depicted our prenegotiation position and requested approval to proceed with negotiations in lieu of a formal presentation of the position, indicates that a prenegotiation conference at Headquarters will be required. A tentative date for the conference has been established as Thursday, October 17, 1968. Due to this additional delay, we are preparing a letter contract to insure that we have continuity of effort. Authority to issue a letter contract will also have to be obtained from NASA Headquarters.

Preliminary data from AEDC testing have verified that the J-2 engine can be uprated on a selected basis for AAP missions.

NOTES CONSTAN 10/14/68

Nothing of significance to report.

NOTES 10/14/68 GEISSLER

1. Mission Analysis for Hydrogen Maser Clock Experiment: Our Advanced Studies Office has performed a mission analysis in support of the hydrogen maser clock experiment. This experiment will test the theory of relativity and will be inserted into an inclined synchronous orbit over Hawaii by a Titan III C launched from ETR. We have generated the performance, and defined the flight environment (accelerations, dynamic pressure, etc.), coast time in both parking and Hohmann transfer orbit, and burn times, and have provided the information to Astrionics, the lead Laboratory. Dr. Helmut Krause of my Scientific Staff provided the following inputs to the problem: a. The astrodynamic constants. . b. The 24-hour satellite's equations of motion perturbed by earth oblateness and solar - lunar attraction. c. Numerical calculations for various eccentricities and inclinations to the earth's equator. d. The mean relativistic redshift and its variation during one orbit revolution for elliptic orbits.

2. Joint NASA-Air Force Clear Air Turbulence (CAT) Program: With the support of the OART Aeronautical Program Division we have engaged in a modest measurement and study program on CAT with the Air Force using their aircraft and our developed FPS-16 Radar/Jimsphere Balloon system. Contractual efforts are with Meteorology Research Inc. of Los Angeles. The main objective is to explore the ability of the FPS-16 Radar/Jimsphere system to detect aircraft related CAT response situations. It is believed that the study will make significant contributions to understanding the aircraft clear air turbulence subject and the study is also related to our space vehicle air turbulence studies. The recent addition of a temperature sensor to the Jimsphere will further enhance its application to CAT studies. The OART Program Office has stated their approval of the program and intent to continue sponsorship of the effort. On-board aircraft response measurements and simultaneous FPS-16 Radar/Jimsphere measurements have recently been made at Wallops Island, Va. and Green River, Utah. Our Aerospace Environment Division is responsible for this work in association with their other atmospheric turbulence investigations.

3. AS-502 SLA Anomaly: The MSC co-chairman of the Flight Evaluation Panel has informed us that they no longer feel the lateral oscillations induced by POGO were a factor contributing to the SLA panel failure on the AS-502 flight. Further analysis of the ALOTS pictures and tests on honeycomb structure leads them to the conclusion that the inner face sheet debonded first followed by outer face sheet failure. The panels are presently vented cell to cell in the honeycomb but are not vented to the S-IVB/IU/SLA cavity. Therefore, sufficient differential pressure exists between the interior and exterior of the panels to cause destruction if a relatively small area of the face sheets is not securely bonded to the honeycomb. Vent holes will be drilled inside the adapter panels on the subsequent missions to reduce this hazard.

4. Technical Publications: A paper by Dr. Lovingood of our Astrodynamics and Guidance Theory Division, "A Special Class of Dynamical Polysystems," has been accepted for publication in the Journal of Differential Equations. The paper is an excerpt from Dr. Lovingood's Ph. D. Thesis.

NOTES 10-14-68 GRAU

No submission this week.

NOTES 10/14/68 HAEUSSERMANN

1. AAP TV Downlink. We have informally been advised that the AAP TV link will be baselined. The system is to:

a. Support ATM and OWS, prime and alternate missions

b. Be transmitted in real time only (at selected ground sites)

c. Transmit in "high quality" commercial format (in contrast to the slow scan system presently on Apollo)

Specific details of hardware implementation have to be worked out with the general guideline to keep total cost under $500K.

2. ATM TV Display Systems. Based on commitments to the scientific community, Headquarters has decided to retain the TV display for the HAO white light coronagraph. Considerations by MSFC had been to eliminate the TV system for HAO due to cost impact (approaching $1,000,000). A low light level TV camera system will have to be utilized which is more costly and environmentally (vibration) more sensitive than a vidicon. The low light level system is also to be used for the NRL TV system for XUV. These TV systems can be tied in with the above mentioned TV downlink capability.

NOTES 10/14/68 HEIMBURG

ACCESS ARM NO. 9 (AA-09-02) The control console and accumulator rack were received from Boeing on 10/14. Environmental Chamber (EC) checkouts and subsystem testing are proceeding without major difficulty. We plan to install control console/accumulator rack and start arm swing tests the latter part of this week.

MODERATE DEPTH LUNAR DRILL Mr. A. Dawley (R-TEST-SP) and Dr. J. Hanley (NASA Headquarters) visited Joy Manufacturing Company on October 10, for a demonstration of their hammer assembly. This hammer, upon arrival at MSFC later this month, will be integrated into the percussive concept engineering model for systems test early next year. The contract goal of producing a hammer which requires only 15 to 18 s.c.f.m. operating gas flowrate was not attained, however, methods for additional reduction of gas flowrate will be attempted at MSFC after the hammer is delivered.

F-1 TURBOPUMP (POGO) Tests were conducted last week to determine the compliance factor for the lox outboard PVC duct. Tests were run under no-flow conditions and with the turbopump isolated from the lox suction line. The lox suction line, filled with lox, was pulsed from 3-25 c.p.s. at suction line pressures of 45 to 125 p.s.i.g. We plan to repeat these tests this week using an inboard lox PVC duct. Latest information from P&VE is that modified inboard PVC duct which we are to accumulate 3,500 seconds of run time will not be available from Boeing until 11/16/68. These tests are not in connection with POGO, but are to qualify the duct.

S-IVB BATTLESHIP TEST STAND (MSFC) As reported in NOTES of 9/30/68, Test S-IVB-066 was terminated at 28 seconds because of a fire. Subsequent to this test, the system was given a leak check and several minor leaks were found from the thrust chamber to the outside, which were repaired. Test S-IVB-067, the next test, was again prematurely terminated (intended 400 seconds) at 82 seconds when a fire in the same general area occurred. Post-test leak checks determined that the guilty component was a static firing transducer which was leaking through the bolt holes in the housing. This transducer had been installed for special tests early in the ASI line failure investigation and had not been removed as it should have been, since it was not of a type (all welded) we normally use for static firing. That this leaking transducer was overlooked after the initial fire can only be explained by the fact that we did not do a good enough job in leak checking; that it was not removed after the special test is a human error.

S-II STRUCTURAL TEST PROGRAM Next test date is dependent upon R-P&VE-North American Rockwell evaluation of inspection results and further data evaluation.

NOTES 10-14-68 HOELZER

PLANS FOR THE FEDERAL DATA PROCESSING CENTER:

Since the Agreement between MSFC and GSA was signed for the establishment of the GSA Federal Data Processing Center (FDPC) in Huntsville, the following progress should be noted:

a. A building located on Jordan Lane has been leased by GSA to house the FDPC.

b. A GSA contract has been let for the renovation of the building to include power, raised floors, air conditioning, and office partitions.

c. A tentative date for GSA takeover (February 1, 1969) has been proposed.

d. Tentative dates for moving the two IBM 7094 systems from Computation Laboratory are established based on the present 503 launch schedule.

7094 System #1 - Late December 1968

7094 System #2 - Early January 1969

e. Detail operating plans are being developed by Computation Laboratory and GSA personnel.

f. A recommendation to utilize the Computation Laboratory support contractor (CSC) was recognized by GSA as the most feasible approach to the early GSA takeover of the FDPC operation.

g. Mr. Carl Thorne, Deputy Assistant Commissioner for Automated Data Management Services, GSA, visited MSFC September 25 and 26 to be briefed on the status of the FDPC planning. Mr. Newby and Mr. Cook met with Mr. Thorne September 26 and the above mentioned items were discussed.

NOTES 10-14-68 JAMES

1. Crew Briefing for C' Mission: On October 8 and 9, 1968, MSFC briefed the Apollo 8 prime (Borman and Lovell; Anders absent) and backup (Armstrong, Aldrin, Haise) crews on current C' Mission Timelines. We appreciate the fine job done by the speakers, R. Smith, G. Wittenstein, F. Swalley, and F. Hammers, and those supporting them, R. Teague, R. Beaman, R. Edwards, and H. Lloyd.

2. S-IC-7 LOX Baffle Failure and S-IC-12 LOX Tunnel Corrosion: Regarding your request for comment on Dr. Lucas's note of September 30, 1968, I am providing a separate attachment for you and Dr. Lucas.

3. AS-503 Software: Delivery of AS-503, C' Mission, Preliminary Flight Program was made on schedule October 11, 1968. Final Flight Program Delivery is still scheduled for November 5, 1968.

4. LH_2 Tank Pressure Abort Cue: Regarding your question on the use of LH_2 tank pressures as an abort cue, MSC questioned use of either ground or spacecraft cues. They point out that the risks of using these abort cues outweigh the advantages. Some reasons given for not using the cues on AS-205 were:

   a. Low criticality of vent valve failing open.

   b. Abort pressure limit very soft (about 21 psia).

   c. Reluctance to abort off a thrusting booster since the concern is only during powered flight, not start.

   d. Inaccuracies and delay time of TM signal.

   e. Spacecraft pressure meters not flight qualified plus poor resolution.

NOTES 10/14/68 JOHNSON

OMSF - Supporting Development Quarterly Review - The executive session, originally "firmly" scheduled for October 23 in Houston, has been cancelled. Dr. Mueller is now proposing a hide-away meeting to discuss the Advanced Manned Mission programs -- Supporting Development, and Studies. We do not yet have a date for this meeting.

Dr. Beggs' Visit - Mr. Miles met with Mr. Lundin in Headquarters on October 9, to discuss the proposed visit of Dr. Beggs to MSFC. The October 24 date still appears good. A tentative agenda, based as much as possible on Lundin's estimates of the areas of greatest interest to him and Dr. Beggs, is being worked out with the Labs. It will be available for your review on October 18.

NOTES 10-14-68 KUERS

1. "MANUFACTURING TECHNOLOGY UNIQUE TO ZERO GRAVITY ENVIRONMENT" MEETING: Plans for this meeting, to take place on November 1, 1968, at Huntsville, have now been firmed up. Personal invitations to the presidents of approximately 50 companies -- mainly non-aerospace industry -- and NASA Centers, and departments of the Armed Forces were sent out last week. The agenda for the meeting has been established and consists of nine short presentations on different manufacturing processes and related subjects, such as development of special equipment; low gravity gradient mechanics; and a brief outline of a technology development plan. The purpose of this meeting is to inform industry management and government agencies of presently visualized unique orbital manufacturing capabilities and to invite industry's participation and support for this development program.

2. ACTIVATION OF THE "SPUR SHOP" AT SSL: After completion of remodeling and installation of machine tools we started operation of this shop last week. We intend to keep the operation of this shop effective and flexible and will make adjustments as the workload requires.

NOTES 10-14-68 LUCAS

1. "A" STRUCTURE: The pre-launch test condition run, simulating pressurization or venting system failures, was started 10-4-68. The LOX tank burst mode on the common bulkhead with the planned 1.2 factor of safety was successfully achieved. However, at the limit collapse mode pressure (reverse pressure on the common bulkhead) reverses in gage polarity and nonlinear characteristics were noticed at 1.0 safety factor. The test was terminated immediately to allow ultrasonic inspection of the bulkhead for debond areas and check of the instrumentation. To date, it is not clear whether there are debond areas of the facing sheet. The instrumentation checks satisfactorily. It is encouraging that the common bulkhead, during the current testing program had withstood 90 burst limit pressure cycles (56 cycles at room temperature and 34 cycles at cryogenic temperature) and 11 collapse limit pressure cycles (7 cycles at room temperature and 4 at cryogenic temperature) before the last sequence. During the prelaunch test condition, the common bulkhead was subjected, for the first time, to a bursting type pressure higher than limit. After the inspection is completed, we will determine the advisability of continuing the test program for the S-IC flight cutoff condition and the design ultimate test neither of which require a reverse pressure on the common bulkhead.

2. SATURN IB WORKSHOP FLAMMABILITY: In my notes of 4-22-68, and 5-13-68, I referred to a developing problem in AAP flammability control. AAP Program Directive #16 issued in spite of objections generated by us and forwarded to Headquarters by Lee Belew makes the MSC document controlling for AAP. The Apollo CM and LM, built to an earlier version of this MSC document, failed dramatically when ignited in a 95% O_2 environment. These failures prompted the ground environment changes now used, air in LM, 60% N_2 40% O_2 in CM. As examples of our disagreement with the MSC document, it permits the use of materials which, when ignited in lg, burn down at a rate of 18 in. per minute. FAA, for example, will not permit installed materials in commercial aircraft which, under the same conditions, burn at a rate in excess of 4 in. per minute. Secondly, the MSC design philosophy is to separate flammable materials with a "fire break" composed of either nonflammable materials or materials which are self-extinguishing. It has been demonstrated by the CM and LM tests that "fire breaks" composed of self-extinguishing materials are unsatisfactory. Our design approach is to eliminate flammable materials or, where such materials must be used, minimize the quantity and carefully isolate these from each other. Our approach is obviously more difficult but so far we have kept flammable materials out of the basic OWS. If we press our point we may jeopardize the main stream Apollo hardware by going on record as questioning the safety of that hardware. We are faced with the following dilemma: accept the inadequate MSC criteria, and face a potential catastrophy as a full partner, or insist that our more stringent criteria govern MSFC's portion of the AAP program. Your guidance is requested.

3. ORBITAL WORKSHOP FANS: The combined ventilation and acoustic test was accomplished in the mockup. With all 17 fans and the 24 in. fiberglass mufflers attached, the speech interference level was measured to be 49 db, which is 6 db below the present criteria established by MSC. A comparable test with no mufflers yielded 73 db.

NOTES 10/14/68 MAUS

NASA APPROPRIATIONS BILL:

This is in answer to your question relative to our 9/30/68 note (See Attachment).

Verbal indication from BOB is that they will not issue New Obligation Authority above the FY-69 Interim Operating Plan level regardless of the NASA FY-69 appropriations. Therefore, $145M would, effectively, be the NASA "tax" under the Revenue and Expenditure Control Act.

MANPOWER COMPARISON OF MSF CENTERS:

Civil Service and Support Contractor manpower projections through FY-74 were submitted to MSF on September 19 by each of the MSF Centers. This information was used by Dr. Mueller during discussions of the NASA FY-70 Budget with Dr. Paine on September 24 and 25. Shown below is a summary of both Civil Service and Support Contractor manpower projections submitted through FY-71.

Fiscal Year	Civil Service (EOY)			Support Contractors (Man-Years)			TOTAL Civil Service & Support Contractors		
	MSC	KSC	MSFC	MSC	KSC	MSFC	MSC	KSC	MSFC
68	4604	2921	6440	9326	8430	4087	13930	11351	10527
69	4384	2921	5981	10000	8778	3251	14384	11699	9232
70	4384	2921	5981	9356	8441	3043	13740	11362	9024
71	4384	2921	5981	9000	8963	2718	13384	11884	8699

It is interesting to note that MSFC is the smallest Center over the entire period in terms of total manpower (i.e., Civil Service plus Support Contractor) and that we are projecting the largest decrease in this total strength.

NOTES 9/30/68 MAUS

NASA APPROPRIATION BILL: The Senate has passed a NASA appropriation bill recommended by the Senate/House Conference Committee at $3,995,273,000. This provided for the Agency

R&D	$3,370,300,000.
CoF	21,800,000
AO	603,173,000

This is $12,727,000 below a previous separately approved House and Senate appropriation of $4,008,000,000. It is however $145,273,000 above Mr. Webb's proposed agency interim FY-69 operating plan of $3,850,000,000 which was designed to absorb part of the required cuts under the program of reduced federal expenditure. The Conference Committee bill now requires final action by the House as part of the Independent Offices and Department of Housing and Urban Development Appropriation Bill.

H.M.
In case this goes thru, is there a plan how the $145M will be distributed?

NOTES 10/14/68 MURPHY

Lewis Hydrogen Safety Manual:

Reference your comment on NOTES 9/30/68 (copy attached), I had also provided copies of our comments to KSC and MSC and have subsequently discussed the subject with John Atkins (Safety Director at KSC). Mr. Atkins stated that they are preparing their comments to the Lewis Manual and will not only concur with our comments, but will provide additional information to further justify non-acceptance of this document as a NASA Standard.

Attachment only - DIR, DEP-T, DEP-A, R-DIR & I-DIR.

S, Col. Mur
Room 612, Bldg. 4200

NOTES 9/30/68 MURPHY

B10-1

Lewis Hydrogen Safety Manual:

Lewis Research Center provided us a copy of the Lewis Hydrogen Safety Manual for our review. The intent of this Manual was to provide a standard for general applicability across NASA. Our laboratories reviewed the Manual thoroughly and found that it should not be adopted as a standard because it would totally restrict operations which we have at MSFC and at our MSFC contractors.

We have responded to Lewis indicating our non-acceptance of their Manual. Additionally, we have sent copies to Mr. Helgeson (NASA Headquarters) and Mr. Lederer (MSF) to insure that this document is not processed further as a NASA standard, or that it is changed to meet our MSFC requirements.

J. M.

Please see to it that Dr. Debus gets a copy so he can also discuss. B

NOTES 10/14/68 RICHARD

C' Mission Crew Briefing: On October 8 and 9, C' Mission Briefings were given to the 503 prime and backup crews in the Simulation Building at KSC. The main subjects covered were: launch interlocks, mission profile, propulsion system timelines, and CM/LV interfaces. Personnel from the following organizations participated in the briefing: Astrionics, Aero-Astrodynamics, Propulsion and Vehicle Engineering, Systems Engineering, and Saturn V Program Office. An update of the briefing has been requested for November 9, 1968.

NOTES 10/14/68 SPEER

Apollo 7:

Prelaunch and launch went like textbook. We summarized all real time results in the HOSC report to Mission Director Schneider at T+6 hours.

The main oxidizer valve did not fully close after LOX dump but stayed open about 13%, probably due to loss of control bottle pressure. This presented no problem.

The LH_2 tank pressure was higher than expected and the passivation valve was initially unable to handle the boiloff rate. The LH_2 residuals at cutoff were higher than expected. We decided to command the LH_2 main vent valve open four times for pressure relief before the boiloff rate was down and then gave go recommendation for rendezvous. After turning the S-IVB/IU retrograde the orbital decay rate was approximately twice the expected. There is speculation that this may have been due to vented gas impingement on the deployed SLA panels. According to Goddard we lost telemetry at 13 hours 57 minutes over Redstone ship. Attitude control was maintained 1 to 2 hours longer.

Rendezvous approach came within 70 ft. of the fast tumbling launch vehicle. The C-band beacon is still working as expected. All due priority post flight evaluation data are now at MSFC and we expect continued smooth data flow as planned.

NOTES 10-14-68 Stuhlinger

1. GAMMA RAY BALLOON FLIGHT EXPERIMENT: The balloon was launched from Palestine, Texas on 10/10; a four-day delay had been caused by bad weather. Total flight time was 12-1/2 hours. The experiment gathered gamma ray background data with different shielding configurations. Telemetry data were very satisfactory. In its satellite flight, the experiment will search for characteristic gamma rays from heavy nuclei in the Crab nebula. Supposedly, these heavy nuclei were left over in the supernova explosion.

2. VISITS TO OBSERVATORIES: Gerhard Heller and I visited two more astronomical observatories, Sacramento Peak (Dr. John Evans) and Lick Observatory (Drs. George Herbig and Bob Kraft). At both places we discussed at length SSL's present activities in astronomical projects, particularly the magnetoheliograph. We were gratified by the great interest of Drs. Evans, Herbig, and Kraft in our projects, and by the encouragement we received for the magnetoheliograph. We also received very valuable comments with respect to the thoughts and hopes of astronomers regarding NASA's scientific programs. I will elaborate on these comments in a trip report.

NOTES 10/14/68 TEIR

I would like to take this means for the Saturn IB Program to thank all of the MSFC personnel that supported and made possible our outstanding success in accomplishing a nearly perfect launch and providing the Apollo 7 mission with a good start. I and all the people in the Saturn IB Program feel that the support as well as our mission success was wonderful. My heartfelt appreciation to all.

NOTES - WILLIAMS - 10/14/68

1. Space Station Logistics - MSF Management Council, 10/11/68, KSC

It was agreed that the request at the meeting by Chuck Mathews (concurred in by Dr. Mueller) for center positions on logistic system concepts and related issues for the mid 70's spacestation would be submitted by the end of October. We will prepare this for you (based upon our discussions last week and those at the Management Council Meeting), and plan to have a draft in a week to 10 days. This submittal action item appears to have evolved into the answer to the earlier request from Dr. Mueller to Mr. Donlan for reviews by various centers on the one-and-a-half stage to orbit concept.

2. Unmanned Planetary Program

Dr. Paine, Dr. Newell, and Milt Klein met October 8, 1968, to discuss their thoughts on the possible payloads for the nuclear stage flight tests to be studied with monies made available by Dr. Paine to OSSA. Dr. Paine and Dr. Newell apparently favor a large probe payload to Mars in 1977, with the possibility of incorporating a sample return probe. OSSA has now indicated that they will break the $500,000 made available by Dr. Paine into at least four studies and that they would like MSFC to run at least two of these, with a total funding of $300,000 if manpower can be made available. We are maintaining close contact with OSSA and shortly should have a first cut at a definitive plan proposing how the money should be distributed.

3. Nuclear Program

An additional $7 million has been added to the FY 69 nuclear rocket program appropriation as a result of the recent overall increase in the NASA FY 69 budget. This brings the total nuclear rocket funds available in FY 69 to $39.5 million. While it has not yet been decided exactly how the $7 million increase will be spent, it should alleviate the major breakup in the Aerojet team forced by the earlier allocation and at least partially offset plans for curtailing NRDS operations. Also, MSFC should benefit somewhat from this through an increase in SRT funds.

October 21, 1968

NOTES - 10/21/68 - BALCH

MISSION:

S-II-5 - Post static checkout and stage modifications are in progress. Removal of stage from the A-1 Test Stand is still scheduled for 11/8/68, and shipment to KSC is planned for 11/26/68.

S-II-6 - Stage was removed from the A-2 Test Stand on 10/16/68 and installed in the Vertical Checkout Building on 10/17/68 for modification. Reinstallation of stage in the A-2 Test Stand for completion of post static checkout is currently planned for 11/16/68.

S-IC-7 - Static firing is still set for 10/23/68 with RP-1 loading scheduled for completion on 10/22/68. The large number of open work items previously reported has been considerably reduced, and preparations for static firing appear to be on schedule.

Spray from Demonstration at MTF - A team from Seal Beach was at MTF this past week for the purpose of demonstrating spray from insulation for the S-II vehicles.

INSTALLATION:

BOMEX - The Port of Gulfport, Mississippi, has been selected as the staging area for the Project BOMEX. Governor Williams and members of his staff welcomed the BOMEX Project Management Team of ESSA to Mississippi at a luncheon in Gulfport on Thursday, 10/17/68. The research vessels of ESSA will be putting into Gulfport in early March to be outfitted for participation in Project BOMEX.

MARL Project - The Mobile Acoustic Research Laboratory (MARL) has now been moved to the third field location at MTF, 750 feet from the S-IC Test Stand, in preparation for the S-IC-7 static firing on 10/23/68.

Public Affairs - Guest list for the S-IC-7 firing on 10/23/68 includes members of the Herman Oberth Society and consuls from Great Britain, the Netherlands, Canada, and West Germany.

NOTES 10/21/68 BELEW

AAP TV DOWN LINK: We have received from Headquarters a letter to proceed with definition of the AAP TV Down Link. It is currently planned to do this in-house.

ATM EXPERIMENT COORDINATION MEETING: Preliminary plans are to hold the next ATM Experiment Coordination Meeting at MSC the last week in November. Emphasis will be on mission operations/control and a tour of the Mission Control Center.

SATURN I WORKSHOP ELECTRICAL CONNECTORS: A demonstration of the new developed Saturn I Workshop electrical connector was presented to MSC Crew Systems personnel on October 15. This connector was developed by Bendix under subcontract to McDonnell Douglas Astronautics Company for preinstalled applications. Four astronauts (Garriott, Weitz, McCandless and Kerwin) were present for the demonstration. The connectors were operated very satisfactorily by McCandless while in a pressurized suit. From all comments made, it was apparent that MSC personnel were quite pleased with the connector and its ease of operation.

AIRLOCK MODULE: A review of CCP's is planned for the week of October 21 at MSC. One significant item which will be discussed is the Electronic Parts Control Program. MSFC has a firm position on this which will be reviewed with MSC and should result in a considerable cost reduction from the present proposed $2.55M effort.

Detailed technical briefings are firmly scheduled for the week of October 28 at MDAC, St. Louis. These briefings will provide MSFC personnel with an in-depth review of the Airlock Module. Approximately 70 people from MSFC will attend.

LM MODIFICATIONS CONTRACT: A letter of intent to award an MSFC letter contract was sent to Grumman last week for design, development, testing, manufacture, assembly and delivery of modified Lunar Modules for use in the AAP program. We have received authority from Headquarters to proceed with the LM for the duration at a projected cost of approximately 85 million.

LM PRELIMINARY DESIGN REVIEW FOLLOW-UP: NASA action items from the LM Modification Program Preliminary Design Review were tentatively assigned to individuals within MSFC and MSC for follow-up. Enclosure 1 shows the tentative assignments for completion of actions and should give you a feel for the extent of involvement by Center people.

Enclosure Dr. von Braun's copy only

NOTES 10-21-68 BROWN

H-1 ENGINE - With reference to my notes of 10-7-68, efforts to determine the origin of the cap screw that was discovered in engine H-7077 continues. It has been determined that the final lox filter at the Test Lab facility uses such cap screws downstream of the filter elements. Test Lab is preparing a memorandum on this subject.

F-1 ENGINE - "Soft" shutdown - A decision was made by George Hage, MA, on October 16 that the "soft" shutdown will not be required for AS-503. We assume that this decision also applies to AS-504 and subs. However, kits are available at KSC should they be needed. Confidence in the change is high based upon current test results.

The F-1 engine gas generator specifications have been changed to delete the requirement for hot firing prior to engine installation and acceptance testing at RETS. This will allow early deactivation of test stand Bravo 1A and result in a cost reduction of about $50,000.

GENERAL - As a consequence of the maturing of the engine projects, we are working on a new format for the Production Support 533 reports (Contractor Financial Management Reports). The new format will reflect the basic elements of work required to support an operational and flight program, whereas the old format was better suited for a development effort.

CONSTAN NOTES 10/18/68

CONGRESSIONAL VISIT

Mr. James E. Wilson and Mr. Peter Gerardi, Staff Advisors, House Committee on NASA Oversight, accompanied by Mr. Jack Cramer of NASA Headquarters, and Dr. Rees of MSFC, visited Michoud on Thursday, October 17, 1968. They were briefed on Apollo management systems by the Boeing Company. Launch Systems Branch, and the Chrysler Corporation Space Division. Messrs. Wilson and Gerardi appeared satisfied with these presentations.

COST REDUCTION PRESENTATION

A presentation outlining the Michoud Assembly Facility cost reduction accomplishments and plans was made to Mr. David Newby, Associate Deputy Director, MSFC, on Wednesday, October 16, 1968. Mr. Aubrey Smith, Chief of the Cost Reduction Office, MSFC, was present at the meeting and was highly complimentary of the presentation.

HEADQUARTERS FOR MILITARY TRAFFIC MANAGEMENT & TERMINAL SERVICE

Col. Gay Campbell, U.S. Army, Commander of the Military Traffic Management and Terminal Service (MTMTS), U.S. Gulf Outport, New Orleans, Louisiana, met with the NASA Michoud Manager on Friday, October 18, 1968. Col. Campbell stated that New Orleans is one of the areas being considered for the Headquarters for the MTMTS. The primary purpose of Col. Campbell's visit was to discuss the requirement for approximately 100,000 sq. ft. of office space in the event New Orleans is selected as the site for the MTMTS Headquarters.

NOTES 10/21/68 GEISSLER

1. LM-A Preliminary Design Review: Subject Preliminary Design Review (PDR), held at Grumman - Bethpage on October 8-10, 1968, revealed that the definition of the overall mission/design requirements is sufficiently lacking so as to preclude a finalized design. The quantitative description of the lengths of time required to accomplish various operational tasks in orbit, amounts of expendables, guidance tolerances, etc., are incomplete either on a vehicle (LM-A) or component basis. If the present philosophy continues to dominate the LM-A program, it is unlikely that this information will be available within the foreseeable future because of continued inclusion of the backup and alternate missions in the overall plan. The backup and alternate missions are merely concepts and cannot now be defined in sufficient detail to be used in design, yet they, rather than the primary mission, represent the extreme limits, of design requirements now being placed on the LM-A. It appears that backup and alternate missions as options to the primary mission have fallen from secondary to tertiary importance in view of the fact that a complete set of backup hardware is available, and that to date, no single failure mode has been identified which would permit the continuation of the mission in a backup or alternate mode, while precluding the primary mission. Unless some remedial action is taken, the progress of the LM-A design upon completion of the PDR activities will be subject to continual iteration by belated definition of backup and alternate mission details. This procedure would be costly and probably unwarranted, even without regard to applicable failure modes. It is our opinion that the best interests of the Cluster Program would be served by establishing design requirements around the primary mission and around existing capabilities derived from the Apollo design having no significant adverse effect on cost, reliability, and performance. Furthermore, all backup and alternate mission considerations should only be allowed to the extent that they do not add new requirements to the contract after the final design is begun.

2. Meteorological Data for the Boeing Company: Personnel of our Aerospace Environment Division are providing Boeing - Seattle detailed wind and temperature profile data (from our 150 m Meteorological Tower Facility at KSC and the FPS-16/Jimsphere measurements) to be used for their company sponsored research on wind shears and stability. The results of these studies will be used in design criteria for the Supersonic Transport and VTOL Aircraft.

3. Crossed-Beam System for FAA: Mr. Ken Power, Chief, Sonic Boom Staff, Office of Noise Abatement, FAA, contacted Dr. Fritz R. Krause, of my Aerophysics Division, during the recent Langley Conference on Noise Alleviation on Large Subsonic Aircraft. He inquired whether MSFC would build a crossed-beam instrument for atmospheric wind and turbulence measurements above FAA's sonic boom test sites. Mr. Power has contacted Mr. John B. Parkinson, Chief, Aerodynamics Branch, Aeronautics Division, OART, on the transfer of FAA funds to OART in support of such an instrument development program. We feel that this enterprise would be beneficial to our Center. The manpower involved would essentially consist of student trainees. You should expect a call from Mr. Powers on Tuesday, October 24, 1968.

G

NOTES 10-21-68 GRAU

1. IU PROGRAM: Manufacturing and test completion status of IU 504 at shipment to KSC on 9-30-68, was greatly improved over prior instrument units. All approved Engineering Change Requests (ECR)/ Engineering Change Proposals (ECP) were incorporated and verified prior to completion of IU retest. The control system null test was not approved by MSFC due to an outstanding Unsatisfactory Condition Report against the flight control computer. Corrective action required will be determined during simulation laboratory testing. Verification of two ECR's approved after IU retest will occur at KSC. We are presently reviewing verification requirements. Additionally, three Engineering Orders are scheduled to be installed at KSC; none of which invalidate the Huntsville retest.

2. RCA-110A P.C. BOARD REWORK: RCA-Huntsville has completed the contract on rework of printed circuit boards on all of the RCA-110A computers. The Huntsville facility still maintains a depot function in support of the computers in the field.

3. "B" NUTS: Six defective "B" nuts were replaced on S-IC-7 at Michoud. After the vehicle was transferred to MTF, the balance of the "B" nuts were checked and an additional ten assemblies were replaced. This completes inspection and replacement of the defective "B" nuts for all S-IC and S-IB stages, assemblies, subassemblies, and storerooms. All present existing "B" nuts are of proper configuration.

4. S-II PROGRAM: As a result of the discovery of improper primer thickness on the forward skirts for S-II-11, 12, and 13, NR/SD performed a limited inspection on S-II-7, 8, and 9 by removal of plugs of SOFI* and measurement of primer thickness. The inspection indicated that primer in the selected areas was also below specified minimum. NR/SD is in the process of investigating various repair methods which may be applicable to the forward skirts. The problem was traced to the addition of primer thinner by a spray operator, at his own discretion, to make the primer less viscous. NR-Tulsa is in the process of implementing a specification change concerning the proper mixing of the M-602 primer, in addition to establishing better controls to cover the actual mixing process.

5. S-IC PROGRAM: Corrosion was discovered on the lox tunnels in S-IC-12. Follow-up inspection revealed similar corrosion on lox tunnels in S-IC-10, 11, 13, and most tunnels in stores. S-IC-8 and 9 were inspected and found free of corrosion. All remaining stages at Michoud will be inspected for this condition. The cause of the corrosion is under investigation; early results indicate a processing problem. No information at this reporting period as to what action will be taken on S-IC-3 and S-IC-4.

* Spray-On Foam Insulation

NOTES 10/21/68 HAEUSSERMANN

1. Electrical Connectors for Space Applications . Attached is a photograph (only to Dr. von Braun's copy) of a new electrical connector specially designed for prolonged exposure to liquid hydrogen temperatures and be capable of a disconnect with electrical loads applied in a highly combustible atmosphere. This capability fulfills the requirements for the orbital workshop. It was also designed for ease of operation by an astronaut in a space suit. The design eliminates the rotational motion for locking and the initial alignment search required in conventional circular connectors. Mating is achieved by a horizontal motion across the interface of the mated parts and locking with a downward motion of the lever shown. The astronauts and other MSC personnel have operated the connector under various conditions. We have left our mockup at MSC and are awaiting their official comments.

NOTES 10/21/68 HEIMBURG

ACCESS ARM NO. 9 (AA-09-02) The Control Console and Accumulator Rack were installed on 10/14 and arm swing tests began on 10/16. The arm extend deceleration valve and cam could not be satisfactorily adjusted because of the excessive internal leakage of the deceleration valve. A new deceleration valve was received from Boeing and installed 10/19. Arm swing tests to set the deceleration valves/cams and park switches continue this week.

S-IVB TEST STAND (MSFC) Test S-IVB-068 was conducted 10/15 for a duration of 355 seconds. There was no fire on the engine during this test as was during tests S-IVB-066 and S-IVB-067, and all test objectives were met.

F-1 TURBOPUMP Static pulsing tests were conducted last week to determine the compliance factor for the lox inboard PVC duct. The tests were run under no-flow conditions with the turbopump isolated from the lox suction line. The lox suction line, filled with lox, was pulsed from 3 - 25 cps at suction line pressures of 45 to 125 psig. Data from the Inboard and Outboard PVC Duct Static Pulsing Tests have been transmitted to P&VE.

S-IVB-507 (SACTO) A full duration (432 seconds) acceptance firing was successfully conducted at the DAC Sacramento Test Site on 10/16. Two burns of the H_2O_2 burner (helium heater) were conducted successfully. The fuel NPSH at start was marginal as a result of the lowered fuel tank pressure to avoid having to cryo-proof the stage.

MODERATE DEPTH LUNAR DRILL The Joy Manufacturing Company designed Lunar Drill was observed in operation at the contractor's plant in Claremont, New Hampshire on 10/10, just prior to the end of the contract period. The drill motor and bit assembly show considerable improvement and operated consistently, but several problem areas still exist. The principal problems are that the gas consumption has not been reduced sufficiently to meet the design requirements and the upper spring clutch requires modification or replacement by a different type mechanism to correct clutch slippage and loss of rotation after a relatively short operating time.

MOBILITY TEST ARTICLES Twenty-one tests were conducted on the Bendix vehicle over the asphalt course; rain prevented additional tests toward the end of the week.

APOLLO TELESCOPE MOUNT The Chinching assembly test fixture was received and one set of tests was conducted on the chain drive assembly test fixture. Preparation for fabrication of the deployment test fixture has begun.

S-II STRUCTURAL TEST PROGRAM Tentative date for the next test is October 24, 1968.

NOTES 10-21-68 HOELZER

1. WIND MONITORING: An interesting use of the LIEF/HOSC and Computation Laboratory facilities was made during hurricane Gladys. Anemometer readings from three pad locations and strain gage measurements from AS-503 were transmitted over the LIEF circuit from KSC to MSFC; the DDP-224 computer was used in real time to compute the bending moment and the Dynatronics PCM (Pulse Coded Modulation) ground station was used to display the anemometer outputs and the bending moment just as in the pre-launch surface wind monitoring scheme. Personnel from P&VE worked around the clock with Computation Laboratory personnel from Thursday noon to Saturday noon. Since the PCM station was also being used in AS-205 post launch reduction, ten minutes of each hour was devoted to wind monitoring and 50 minutes was used for AS-205 oscillograph production except during high winds when the system was used full time for wind monitoring.

2. HEADQUARTERS PROGRAM OPERATING PLAN SUPPORT: The R&D Program Operating Plan (POP) 68-2 cycle was completed within the shortest timeframe to date. The Center budget cycle data was brought into the Data Center Division October 7, 1968, by personnel representing the individual NASA Centers (KSC, MSC, & MSF). The 68-2 final cycle was consolidated for Headquarters on October 11, 1968. An abnormal amount of work was accomplished during this report period due to changes in the breakdown of the Apollo Applications funds. These changes involved reflecting the adjusted obligated amounts for the previous fiscal year. Also, two new hardware project areas were provided for Lunar Exploration and Future Space Station. Headquarters' personnel were highly complimentary on the cooperation and support received.

3. TWO SHIFT OPERATION: Two shift operation of the EAI 8900 Hybrid Computer system (with the third shift reserved for maintenance) will begin on November 4, 1968, in response to urgent requests for simulation of the Apollo Telescope Mount by Astrionics Laboratory.

4. MEETING ON STRUCTURAL TEST FACILITY: A presentation on the status and future computational support of the Structural Test Facility at P&VE was given to Mr. Kroll, Chief Structures Division. The present system consisting of two GE-235 computers and a DN-30 computer will be replaced by a SDS-930 computer including a connection to the time-shared UNIVAC 1108. The new system will allow dynamic testing of structures and "quick-look" on-line analysis during a test so that critical trends can be immediately detected. It was agreed between P&VE and COMP that an ad-hoc committee will be formed to assure that the requirements of all segments of P&VE are met in COMP's design of the software for the system and the transition to the new computer configuration does not interfere with the planned test schedule.

NOTES 10-21-68 JAMES

1. S-IC-7: The static firing of S-IC-7 is currently set for October 23, 1968. In view of your expected visitors, our S-IC Stage Office will notify you directly should any change occur.

2. S-II-5: S-II-5 was re-installed in the A-1 Stand at MTF on October 11, 1968, for retest of modifications and post-static checkout.

3. S-II-6: S-II-6 was removed from the A-2 Stand at MTF on October 16, 1968, and placed in the Vertical Checkout building for modifications.

4. S-IVB-507: S-IVB-507 was static fired on October 16, 1968, as planned. Quick-look review of data indicates all test objectives were achieved.

5. Saturn V Dynamic Test Equipment: As a result of the Control Dynamics and Structural Feedback Committee meeting on October 8, 1968, it has been concluded that further dynamic testing is not required. Since the AAP Office is interested in having this equipment available through 1971, we plan to accomplish cleaning and preservation utilizing Boeing's technical capability. This requires about forty (40) manmonths of effort beyond the current contract expiration on October 31, 1968.

6. AS-503 Structural Assessment: A review of the AS-503 Joint Structural Assessment Team was held on October 17, 1968, attended by Headquarters, MSC, and MSFC. The team, especially P & VE Lab (Messrs Mulloy, Zimmerman, Stephens, Arnts, et al) has done an excellent job of putting the many complex structural problems into one coherent package. Results at this time still look good. Although completion of assessment is about two weeks after the Design Certification Review, November 7, we will identify open items at the DCR and close them out as a matter of record in the usual manner.

NOTES 10/21/68 JOHNSON

Mr. Beggs/Mr. Lundin Visit to MSFC - Copy of agenda for the October 23-24 visit was forwarded to you via Jim Shepherd October 17. We learned late Friday Dr. Newell and his party of three will also be here on the same days. It is planned that they participate in part of the Mr. Beggs/Mr. Lundin agenda. Time will be set aside for a meeting with you. The final agenda is being worked out with Jim Shepherd.

Materials for OART Congressional Presentations - We recently received an action item on a request by Mr. Beggs to provide information and materials in support of his forthcoming FY-70 Congressional Presentations. This material is being assembled and is to be forwarded to OART by November 1.

NOTES 10-21-68 KUERS

1. Manufacturing In-Space Experiments M-492 and M-493: An interface drawing locating these two flight experiments (EB Welding and Tube Brazing) in the MDA has been established with P&VE. This document allocates a definite position for the experiments in the MDA and will be the official document for the interface control of the experiment development with the MDA and OWS. The design of this experiment hardware is of a modular concept and consists of an EB gun and an experiment chamber into which first a miniature welding positioner and second the exothermic brazing module are mounted. We are now developing plans to use the same chamber and the same EB equipment for two more flight experiments: a demonstration of casting spheres without a crucible and a crystal growth experiment.

2. LM Descent Stage Propellant Tank Failure: As you know, one of these titanium tanks ruptured recently during a qualification test. It was suspected that this rupture was caused by a weld failure. A few months ago, MSC had asked us for support in the evaluations of different manufacturing techniques for the modification of these titanium tanks as proposed by Airite and Aerojet, sub-vendors of Grumman. Our conclusions and advice have not been followed in this case for contractual reasons. Although it is not even proven that a bad weld had caused this failure, a detail story about this case and our involvement has been published in the "Aviation Week" of October 7, 1968. The source of this information is unknown; it did not come from our personnel.

NOTES 10-21-68 LUCAS

1. S-II STRUCTURES TEST

(a) "A" STRUCTURE: Reference my notes of 10-14-68. It has been established that the bulkhead fairing sheets are not debonded from the honeycomb core. Thus, it must be assumed at this time that the instrumentation malfunctioned. To discriminate between two non-destructive testing techniques, it was necessary to cut a plug from the bulkhead. Repair of the plugged area as well as minor damage resulting from the inspection will be completed today. Reinstallation of instrumentation on the bulkhead will be finished Tuesday and testing should be resumed by Friday (10-25-68) at the earliest.

(b) "B" STRUCTURE: Inspections of the outer surface of the forward bulkhead of the "B" structure along the meridional weld and in regions of the membrane area where gages have been installed indicate severe corrosion which may have degraded the assembly's structural integrity to a hazardous condition for the remaining tests. Dye-penetrant and X-ray inspections also indicate many cracks on some meridian weldments. The cracks seem to be confined to extra wide, multiple pass weldments resulting from the replacement of gores in the bulkhead during fabrication. The cracks are on the outside of the bulkhead, covered by insulation. A complete map of all defects is being prepared, and an assessment is in progress. Almost certainly, the bulkhead will require repair either by rewelding or the addition of doublers before continuation of testing. We are pushing the resolution of this problem because the "B" structure bulkhead is the one portion of the test item related to S-II-503.

2. POGO: The fifth POGO Working Group Meeting is scheduled for 10-23-68, in building 4610, room 5045, beginning at 10 a.m. Early during S-IVB stage powered flight of AS-205, one of the astronauts commented that the flight was somewhat "bumpy." A preliminary look at the oscillogram of a longitudinal accelerometer in the IU showed maximum amplitude of approximately $\pm$ .04 g's in a frequency range of 20 to 40 cps. This is the only longitudinal data available at present. However, from these data, the oscillations are very low, and there is no indication whatsoever of POGO.

3. AS-503: In anticipation of high ground winds in the vicinity of Launch Pad 39, personnel from our Structures Division maintained 24-hour surveillance at HOSC of strain gages on AS-503 displaying in real time bending moments and wind velocities. Peak wind velocity noted was 45 knots at the 60-foot level. Tables showing the parameters of wind velocities, altitude, and azimuth were prepared as a guide for a recommendation to KSC should it have become necessary to roll AS-503 back into the VAB.

4. SHORT STACK STATIC TEST (SSST) AT WYLE LABS: The End Boost condition dynamic test (100% static and dynamic loads) was completed satisfactorily last week. We supplied substantial help in solving some "shaker" problems and in getting the test accomplished.

5. SATURN IB - AS-205: The strain gage-bending moment was monitored in real time for the AS-205 prelaunch and launch activity. The maximum moment recorded during the prelaunch activity was 3 million inch-pounds (20% design). Strain gage readings recorded during the flight show the maximum moment to be 8.3 million inch-pounds (17% design), which occurred at T $\pm$ 75 seconds. Based upon the measured wind velocities, our analysis would have predicted a bending moment at least twice as high as measured by the strain gages.

NOTES 10/21/68 MAUS

NASA OVERSIGHT SUBCOMMITTEE VISIT: Staff members, Messrs. James Wilson and Peter Gerardi, of the NASA Oversight Subcommittee, visited Michoud Thursday October 17, and were given presentations by the Boeing Company and Chrysler Corporation which apparently were well received. On Friday October 18, they visited MSFC. In our management presentations we highlighted the evolution of the Center organization and management structure to accomodate our role as a major Apollo Program management Center for development of large launch vehicle research and development projects. We covered the development of an effective mutual support organization consisting of industry and strong in-house R&DO support and illustrated through specific problems and management events, the basic features of the Apollo management system (i.e., methods of early problem detection, actions and process for problem solving, actions and process for recovery from anomalies and failures). We also pointed out the need to begin considering how to reconfigure the MSFC organization to adapt to the changing nature of our role in NASA as Apollo nears completion.

UNOBLIGATED FY-67 ADVANCED MISSION STUDY FUNDS: A policy has been established by Dr. Paine/Mueller, to obligate all FY-67 SRT study funds by December 31, 1968. Study funds not obligated by this date will be transferred to some other use. Marshall has six Advanced Missions studies (Approximately $1.4 million) in this category which we are subject to losing unless expedited actions can be taken to process them through Headquarters. We are currently working with representatives in Mr. Donlan's office (MT) in an attempt to reduce the time spans between Work Statement Approvals, Critical Procurement Releases and Authorizations to Negotiate (all Headquarters actions) in order that we may meet this deadline.

NOTES 10-21-68 MOHLERE

Negative Report.

NOTES 10/21/68 MURPHY

Boeing TIE Systems Safety Effort

The second status meeting of the Boeing TIE Analysis work in System Safety was held at MSC on October 16, 1968, with OMSF, MSC, KSC, MSFC, and Boeing TIE. After the Boeing briefings, Bill Schneider held a separate meeting with the three Centers to discuss some of the things that KSC had brought up in an earlier meeting with Gen. Phillips. KSC had raised questions as to the validity of the Boeing TIE effort in System Safety and also questioned their future role for calendar year 1969. Recognizing both the operational and political impact of such a decision, Gen. Phillips gave Chuck McGuire the task of coordinating with Jerry Lederer (OMSF) and the Centers on the future work in System Safety for Boeing TIE. Some specific questions that the Centers are to answer are as follows:

a. Should the present work on fault tree (a logic diagram technique) analysis be continued; if so, in what form?

b. Should we redirect the fault tree analysis to the lunar mission?

c. Should the System Safety effort be reoriented, or should the entire Boeing TIE effort in System Safety be discontinued?

We expect to get an official request from Gen. Phillips the first part of this week to meet with him at an early date and provide a Center position on these questions. We are working very closely with IO & R&DO in this area and will keep you informed.

NOTES 10/21/68 RICHARD

No submission this week.

NOTES 10/21/68 SPEER

1. AS-503 C Prime Flight Mission Rules: We have scheduled a review of all open 503 Flight Mission Rules on October 22, 1968, with R&DO, the Program Office, and stage contractors. This is prompted by the pressing need to get commitment on the rules as the crew and flight controllers are going into simulations now, and a significant number of open problems exists. There are also several principal questions requiring a Center position, such as the Go - No Go criteria for a manned restart.

2. AS-503 C Prime Mission ARIA Requirements: In order to permit meaningful trade-off studies of the telemetry support provided by the six Apollo Range Instrumentation Aircraft (ARIA) committed to Apollo 8 we have formally transmitted the L/V requirements and their priorities to MSC. This is important in view of the current uncertainty about the VHF capability of the ARIA. The eight L/V telemeter links have been divided into three groups with the two PCM links having first priority. Due to the limited area coverage in the Pacific for the second burn, priorities were also developed for the various phases of the 16.5 min. total desired coverage, emphasizing beginning and end of burn, and the beginning of the pre-ignition sequence. These ARIA may be the only source for engineering data during second burn and the combined MSFC-MSC requirements will be considered in the final definition of the C Prime launch window.

3. HOSC Monitoring of Complex 39 Ground Winds: In light of Hurricane Gladys, the HOSC display system was called up, at the request of P&VE, to monitor the ground winds at Complex 39 (AS-503 Vehicle). The maximum condition experienced by the vehicle was 40 knots (gusts to 45 knots) on October 17. Personnel from R-P&VE-S performed the analysis in the HOSC during all times of strain gauge and anemometer data display.

4. AS-205 Photographic Support at KSC: Recent reductions in KSC's photographic support capability will result in significant delays in film processing. However, by previous agreement, we have received the first priority engineering film at T+12 hours. ALOTS coverage was exceptionally good.

NOTES 10-21-68 Stuhlinger

No submission this week.

NOTES 10/21/68 TEIR

TERMINATION OF THE 207/206 DUAL LAUNCH MISSION: General Phillips on October 16, 1968, in a TWX of that date, terminated the requirement for an Apollo Saturn IB dual launch mission and directed that Saturn IB launch vehicle program be phased down to a level of effort required to put the launch vehicles in storage, to perform necessary functions during storage and to maintain the capability to build up to support the AAP launches. The necessary contractual action is being initiated with the stage, GSE, and systems engineering contractors to implement the phasedown at the earliest possible time. Supplemental agreements with several of our contractors have already been consummated. All required contractual direction will be completed by October 23, 1968.

KSC has terminated most of the Saturn IB and LC-34/LC-37 contracts and is in the process of writing new contracts for the following:

1. Complete all reports which would normally have been furnished after the 205 launch.

2. Complete mods to GSE and ESE which are presently in work and identify configuration of GSE and ESE for which KSC has maintenance and operational responsibility. Mods which have not been started will, in general, not be worked.

3. Prepare equipment on Pads 34 and 37 for long-term storage.

AS-205 LAUNCH VEHICLE FLIGHT EVALUATION: At this time, there have been no basic changes to the findings presented in the 72-hour flight evaluation report and there have been no further performance deviations identified.

SHIPMENT OF S-IVB-211: S-IVB-211 was shipped, as scheduled, from MDAC, Huntington Beach, to Sacramento for long-term storage on October 17, by Super Guppy. No mod work will be done prior to placing the stage in long-term storage.

NOTES 10/21/68 WILLIAMS

I. LAUNCH VEHICLE PROGRAMS

a. An Intermediate Vehicle Summary Report has been prepared for Les Fero for the Aeronautics & Astronauts Coordinating Board (AACB).

b. Low Cost Launch Vehicle Study - TRW and Headquarters visited us (10/16/68) to discuss our in-house efforts on pressure-fed launch vehicles which may be applicable to their contract (Low Cost Launch Vehicle Study) with NASA Headquarters of low cost launch vehicle systems suitable for missions in the '73 - '85 time period. TRW will also have similar discussions with KSC and LaRC.

c. Intermediate Size Lunar Landing Spacecraft - We have advised Ben Milwitzky that we cannot support the proposed "Intermediate Size Lunar Landing Spacecraft Study." This action resulted from the recommendations of the FPPB meeting.

d. Low Cost Logistics Systems - We have been notified informally that action resulting from the Management Council meeting at the Cape (10/10/68), to prepare a written response on Center Management's position regarding alternatives and key issues by 10/31/68, has been changed somewhat. You may now be requested to give a briefing on this subject at a later date. We will inform you when final word is received and plan to prepare a response (letter or briefing) based on our recent discussions with you, including your comments at the FPPB meeting. We will request time for your review prior to finalizing the material.

II. SPACE STATION

The Project Definition Study workstatement is in preparation. A first draft working copy was distributed to, and discussed with, ASO (including co-located) personnel and other laboratory representatives working with us on the Space Station. As you know, plans throughout the agency (including management consideration, we discussed with you earlier) are shaping up on this effort. We feel that we are beginning to move into significant study activities - $10.2 million total NASA contracted effort with approximately $3 million for MSFC for FY 69 funds - and would like to discuss the workstatement with you from time to time as it evolves. Also, in working with our co-located laboratory groups, we plan to have discussions with the Lab Directors and their personnel to obtain their inputs and support to reflect a total MSFC view in the workstatement.

III. NUCLEAR PROGRAM

Dr. Mueller recently asked if we had ever looked at nuclear systems using the NERVA engine to carry a payload to Mars orbit, return to earth orbit, and be reusable. The reply, after discussions among Headquarters, Advanced Manned Missions; (SNPO); and our office, suggested that such a system does not appear practical (see enclosure). It also noted investigation on a similar system for a lunar orbit ferry, which also did not appear to be economical. Dr. Mueller apparently did not accept this as final and has asked Doug Lord to have us look into this further and give him a report.

North American gave their NUSAT briefing (as presented to you) to Finger/Klein/Wyatt, Space Council, and Gehrig, Staff Director, Senate Space Committee. Response was favorable, and encouraged them to present to other people in and out of the agency.

October 28, 1968

NOTES BALCH 10/28/68

MISSION:

S-II-5 - Post static checkout continues in the A-1 Test Stand. Shipment to KSC is still planned for 11/26/68.

S-II-6 - Stage is still in the Vertical Checkout Building undergoing modifications, and reinstallation of stage in the A-2 Test Stand is still set for 11/16/68.

S-II-7 - Turnover meeting was conducted at Seal Beach on 10/28/68. The turnover information presentation was the best to date. Vehicle is scheduled to be shipped on 10/29/68 and to arrive at MTF on 11/12/68.

S-IC-7 - Static firing scheduled for 10/23/68 was postponed because of erractic LOX level sensor operation. After extensive checkout of circuitry, it was concluded that all abnormal operation had been caused by a high resistance in a pin connection at the umbilical, which has now been remedied. Present schedule calls for RP-1 loading today and static firing at 3:00 p.m. tomorrow, 10/29/68.

INSTALLATION:

BOMEX - Negotiations with GE on BOMEX contract are proceeding as scheduled. Program execution plan is being formulated. The search for surplus equipment within the NASA system for use on BOMEX has not been very fruitful to date.

MTF Motor Pool Operation - GSA has proposed that NASA take back the function of driving GSA vehicles and the corresponding personnel spaces. At a meeting in NASA Headquarters, attended by representatives from OMSF, KSC, MSC, MSFC, and MTF, this proposal was generally rejected, and the position was taken that the current agreement should either continue as is or be eliminated completely, with the complete function once again being contracted.

Weather Bureau Services at MTF - Information has been received from Mr. Ken Nagler, Space Operations Support Group, U.S. Weather Bureau, ESSA, that current plans are to leave a complement of four Weather Bureau personnel at MTF instead of removing all personnel, as previously planned.

GENERAL:

Public Affairs - Seventeen members of the Hermann Oberth Society visited MTF on 10/23/68. I welcomed the group and gave them a briefing, after which they were taken on an extensive tour of the facility.

NOTES 10/28/68 BELEW

AIRLOCK MODULE: The briefing on the Airlock Module (as reported in last week's notes) was originally scheduled to be held in St. Louis at McDonnell Douglas Astronautics Company (MDAC) has now been changed to MSFC. This will be a two-day presentation on October 31 and November 1, 1968. A schedule has been distributed.

ATM PRELIMINARY DESIGN REVIEW: The ATM PDR Preboard and Board met at MSFC October 22-23 respectively, and disposed of all review item discrepancies (138 total) generated at the PDR technical working sessions during September 24-26. The Boards included representatives from KSC, MSC, NASA Headquarters, Principal Investigators and MSFC. The need for a delta PDR in about 4 months to cover EVA requirements and hardware development was identified. The PDR seemed to have satisfied all participating elements and represents a significant ATM milestone accomplishment.

LM/ATM EVA WORKING GROUP: The LM/ATM EVA Working Group met at MSFC on October 24. A schedule for simulation (1 "g", 0 "g", and Neutral Buoyancy) was presented which leads up to the delta PDR for EVA and Film Retrieval. Some elements of the schedule were in question, however, a delta PDR can be supported in early March 1969. The concept being designed by P&VE for translation and film transport will be tested for feasibility in Neutral Buoyancy in mid November.

ATM FILM CAMERA MEETING: An ATM film camera meeting will be held at MSFC on October 30. Representatives from the P.I.'s, GAEC, North American Rockwell, MSC, and MSFC are expected to attend. This is a follow-up to meetings held at MSC on August 9, and GAEC on October 11. The items to be discussed include (a) GAEC's concept of mounting the cameras, (b) thermal and vibration environments in the LM, and (c) temperature tests being conducted on the films.

ATM FOLLOW-CN STUDY: A review of the ATM follow-on study and redirection discussions are scheduled for October 28-30, to reflect the comments in Mr. Luskin's letter of October 3, in which a continuation of the study through Phase II was authorized by OMSF. Since the study is presently structured in three phases, a final report had not been planned after completion of Phase II. However, since the results of this study are urgently needed for the Future Space Station Study, it will be required to document Phase I and II results to assure dissemination to the Future Space Station effort in case that Phase III will not materialize.

LETTER CONTRACT: Mr. Lew Evans, President of Grumman, signed and approved the MSFC letter contract for AAP Lunar Module Modifications on October 25.

NOTES 10-28-68 BROWN

J-2 ENGINE - Operational and Flight Support (formerly called Production Support) Follow-on Contract - As you recall, the present contractual coverage for the J-2 Operational and Flight Support ends December 31, 1968. The requirement for follow-on effort to support the Saturn Apollo Launch Schedule through runout was recognized in our procurement plan which was approved January 13, 1966. A justification for noncompetitive procurement and negotiation D&F was submitted to the Director of Procurement March 21, 1968. Approval to negotiate this continuance of effort was received August 29, 1968. Due to the delay in receiving authorization from Headquarters and the urgency of completing the contractual cycle, a TWX depicting our prenegotiation position was transmitted to Headquarters October 3. We had hoped that the TWX would be accepted in lieu of a formal presentation at Headquarters.

We were advised on October 9 that a presentation would be required. Following the presentation of our position on October 24, verbal approval of a prenegotiation position was received from General Bogart. Negotiations are being pursued as expeditiously as possible to prevent a gap in the effort or the necessity of issuing a letter contract. However, recent queries from Headquarters indicate that certain staff personnel (especially the Legal Office, who by the way, was represented at the presentation) are dissatisfied with the position approved by General Bogart and are indicating that though they can not stop us from negotiating, we can expect difficulty in getting the negotiated contract modification staffed through Headquarters. This kind of "split decision," which seems to be on the increase in recent months, seriously weakens our negotiating position. It not only produces uncertainty as to what we should be negotiating, but the subsequent queries also seriously drain the limited manpower available for the negotiations proper. Since in this environment it is unlikely that the tight schedule can be maintained and since the Center has established a position (per recent conversations with Dave Newby) that there will be no letter contracts, there is a distinct possibility that we will have a serious discontinuity in the program.

NOTES CONSTAN 10/28/68

VISITORS

Seventeen members of the Hermann Oberth Society (One of the two major astronomical societies in Hanover, Germany) visited in Michoud Assembly Facility on October 23, 1968, for a briefing and tour.

NOTES 10/28/68 GEISSLER

1. Jet Plume Impingement on AAP: Re: Your comment on item 2, Notes 10/7/68, Geissler, copy attached. Jet plume impingement forces, local loads, and heating are one of our major concerns on our AAP configurations. Except in geometrically simple cases, we have a relatively low confidence in calculated impingement effects, especially as far as forces are concerned. We strive therefore to develop an experimental capability. We follow two approaches. The first one uses our Low Density Wind Tunnel; it promises fairly simple technique-requirements and early results, but is restricted to cool or warm CO_2 as working medium. The second approach uses the Impulse Base Flow Facility (IBFF), i.e., our base heating tank, where we can establish hot jet plumes of correct chemistry by a shock tube-like method. This is the ideal laboratory method for establishing orbital jet plumes (no restrictions by pump capacity, due to short duration), but we pay for this advantage with the greater difficulties of short duration measuring. We are equipping the IBFF with LN_2 cryopanels to reduce wall reflections and lower the vacuum pressure. Both approaches are as yet in their infancies. We have learned at two Jet Plume Conferences this year (Aerospace Corporation July 11-12, 1968, AEDC October 15-16, 1968) that our orbital plume impingement problems are evidently unique. This is due to the size and complexity of our AAP configurations, as well as to our docking and maneuvering operations. They create potential impingement problems far beyond those of other groups. We can therefore, not bank on obtaining much of our information from the work of others. Manpower (both civil service and mission support) is our chief bottleneck. It keeps our progress painfully slow, and will become worse in January.

2. AIAA Space and Atmospheric Physics Committee: We have been informed that the Chairman of this committee has nominated Dr. L. DeVries for membership in 1969. Dr. DeVries is Deputy Chief of our Aerospace Environment Division. This recognition of our space sciences work areas will be helpful in our study efforts and discussions with other groups.

3. BOMEX Project: At the request of the ESSA BOMEX Project Office in Washington D.C., we have furnished the MTF-GE BOMEX contract group with copies of our rawinsonde data reduction scheme.

NOTES 10-28-68 GPAU

1. CORRODING OF RCA 110A COMPUTER CONNECTORS: Astrionics Laboratory, RCA, and this Laboratory met recently to resolve corrosion problems on the RCA 110A printed circuit board connectors at Cape Kennedy. Primary consideration was for the integrity of AS-503 GSE. The corrosion was tentatively identified as silver and copper sulfide, predominantly on the printed circuit board spring receptacle. It is known that this condition can cause a drop of up to 0.2 volt with associated "noise". This Laboratory is presently in the process of ascertaining if the corrosion is, or has the potential to become, sufficiently severe to cause malfunction under operational conditions. We are also evaluating a cleaning and protective coating process proposed by RCA in the event progression of the sulfide ~~resistance~~ corrosion is sufficient to cause malfunction.

2. S-II PROGRAM: Hydraulic pumps that were used for qualification were subsequently installed on S-II-8 and S-II-9. The situation was discovered by NR/SD during a routine stage component traceability verification. A requirement has existed for quite some time to mark, by some obvious means like red paint, all test hardware. An immediate review of the test hardware identification system and a search for all test hardware has been initiated. It should be pointed out to the contractor's credit that the double check afforded by his Technical Information traceability system paid off in this case.

NOTES 10/28/68 HAEUSSERMANN

1. ATM Preliminary Design Review. The formal board for the ATM PDR was held last week with MSC, KSC and NASA Headquarters. Many of the items which involved considerable discussion centered around changes or additions to ATM which would add to the costs and complexity of the system. Some of the specific areas were: (1) add another telemetry downlink transmitter for backup purposes, (2) make the digital computer redundant so as not to have to depend upon the astronaut in a failed mode of the computer, (3) add a redundant digital command system and not depend upon the astronaut voice link for the backup mode, (4) revise the fine sun sensor readout concept (5) perform a "research" program on the canister gimbal torquers. Our basic approach has been to accept some loss of data under certain modes of failure, to make reasonable use of the astronaut for backup modes of operation and to hold the line in costs especially in the areas of making the system better than originally required.

2. ATM Fine Sun Sensor. The first prototype from Honeywell has been undergoing extensive evaluation in the Astrionics Laboratory. One of the design problems we have encountered is with the positioning system for the offset wedge. A low torque a. c. motor with three gear passes is the present design. This approach is questionable from the standpoint of ease of astronaut positioning as affected by gear backlash and reliability, i. e., inability of the low torque motor overcoming gear friction variations. We have breadboarded a d. c. motor drive which has a higher torque capacity and only requires one gear pass. The d. c. motor approach should minimize the problems encountered with the present design. The electronics for the d. c. drive system are also more simple and reliable. Honeywell engineers have seen the breadboard and a technical evaluation as well as their cost impact will be submitted in about a week.

NOTES 10/28/68 HEIMBURG

S-IVB (MSFC) Test S-IVB-069 was conducted 10/22 for a duration of 386.7 seconds. All objectives were accomplished. A fire was discovered in the thrust chamber approximately 13 minutes after cutoff. Data review indicated the possibility of gas generator (GG) fuel valve failure. The GG control valve was removed from engine and R-QUAL ran an LN_2 flow test on the valve. The GG fuel valve failed to close during the flow test. The valve will be vacuum dried and the test re-run today. The possible cause of the failure could be moisture, excess lube or improper assembly. There was no engine damage due to this fire.

F-1 TURBOPUMP Three static lox suction line pulsing tests (SLP 13, 14 and 15) were conducted at the F-1 Turbopump Test Facility 10/23 in support of the S-IC POGO Program. The turbopump inlet pressures were 125 p.s.i.g., 85 p.s.i.g. and 45 p.s.i.g. respectively. The upstream pulser was utilized to introduce pulsing frequencies of 3 to 25 c.p.s. The purpose of the tests was to isolate the PVC from the turbopump to determine the compliance that the PVC contributes to the system. The PVC was wrapped with mylar and purged with GN_2 to prevent any frost accumulation on the PVC prior to and during the tests to determine if frost trapped between the PVC convolutions, as experienced in previous tests, would cause additional stiffness of the PVC. Test data is being evaluated with P&VE.

S-II STRUCTURAL TEST PROGRAM Reference Dr. von Braun's comment in NOTES 10/7/68: Conclusion as of today is that bulkhead did not buckle. Test was stopped because strain gauge instrumentation indicated buckling. Debonding condition (the expected result of buckling) was identified by Fokker Tester. Both indications were determined to be erroneous by visual inspection and pull test of plug from bulkhead. Conclusion: bulkhead is OK and tests will proceed.

The S-II (V7-21) Stage Structural Test, Phase VIIC, was successfully accomplished 10/24. The final test is tentatively scheduled for 10/31.

ACCESS ARM NO. 9 (AA-09-02) Arm swing tests to set the deceleration valves, cams, and park switches have been successfully completed. System test will begin on 10/28.

MOBILITY TEST ARTICLES Seventy-five tests were conducted this week on both vehicles (Bendix and General Motors). This leaves approximately 40% of the agreed upon program to do unless some of the tests must be repeated.

NOTES 10-28-68 HOELZER

NEGATIVE REPORT.

NOTES 10-28-68 JAMES

1. Apollo 8 (AS-503): (a) General Phillips has requested that MSFC assess the impact of providing a lunar mission launch window for early January (approximately January 5-8) for the AS-503 C' Mission. Results of this assessment, given at MSC on October 27, show that the early January window can be met by delaying or deleting the verification of the January 18-24 window software. (b) NASA Headquarters has advised that the Apollo 8 Flight Readiness Review will be November 19, 1968, rather than November 20. (c) Although AS-503 Launch Vehicle processing at KSC is two (2) days behind schedule, it is expected that the December 6, 1968, launch readiness date will be met.

2. Short Stack Tests at Wyle: The 100% (with POGO vibrations applied) and 140% Max Q Alpha Tests were completed October 24, 1968. Preliminary results appear satisfactory. These tests complete the Short Stack Test Program, based on the decision of Headquarters, MSC, and MSFC in the October 23 telecon to limit vehicle accelerations for AS-505 and subsequent to four (4) g's by early S-IC center engine cutoff. This limitation had already been placed on AS-503 and AS-504. Test specimens will probably be destacked next week.

3. S-II Structural Test: The S-II lightweight structural test program passed an important milestone Thursday, October 24. The A structure, located at the Test Laboratory, successfully completed the ultimate S-IC cutoff loads test to flight requirements. The final test to ultimate design conditions is expected to be completed this week. Our one remaining problem area is with the B structure at Santa Susanna, where crack problems with repaired weld areas in the forward bulkhead have slipped the test completion until December 15.

NOTES 10/28/68 JOHNSON

Nothing of significance to report.

NOTES 10-28-68 KUERS

1. Project Super - AEDC Support: On request of the Air Force, we are supporting the Arnold Engineering Development Center in Tullahoma in nickel plating a wind tunnel nozzle for them. This nozzle is 47" in diameter at the wider side, 47" long, and weighs approximately 2600 pounds. There is no facility existing in this area which would be capable of handling this job. We have also to improvise the handling of this nozzle since our crane in the surface treating building cannot lift this load. This job is, of course, very urgent to keep the downtime for the wind tunnel to a minimum. Target date for delivery is October 30.

2. Serpentuator Delivery for Neutral Buoyancy Simulation: Last week, the Astro-Space Laboratories delivered to us the neutral buoyancy serpentuator which we are planning to use for full size simulation of EVA for the ATM. Astro-Space has designed and built this neutral buoyancy test hardware consisting of eight links and the base control station, while we have designed in-house the tip link which provides for 360° rotation as well as for swivel in two planes. This tip link is still in fabrication. Before putting the whole assembly into our neutral buoyancy simulator, we will deploy it first in one plane in a dry mode while each link is supported by an air bearing. After this functional checkout, it will be installed into the big tank.

3. Development of ATM Cameras: ME Laboratory is presently engaged in fabrication and assembly of the film cameras for the Goddard X-ray experiment and the H-Alpha #1 experiment. The first camera and magazine, an H-Alpha #1 engineering model, has been completed last week. The focal length of this specific camera is extremely critical with a maximum overall tolerance buildup of $\pm$ .0006". Electron beam welding is used for the joining of the film platen to the data block housing. Design of the first six units has been released by R-ASTR in the form of sketch drawings. The first camera has been fabricated, assembled, and operated under close surveyance of R-ASTR designers. This involves not only "making the items work", but also carefully documenting changes required on future models by a drawing control system tailored to this project. Currently 745 machined parts are under this control. The necessary equipment and the process for application of solid film lubricant have been closely coordinated with P&VE Materials Laboratory and the Midwest Research Corporation.

NOTES 10-28-68 LUCAS

1. POGO: The major conclusions reached during the Pogo Working Group Meeting on October 23, 1968 were: (a) Fuel and Lox suction line frequencies have been established with sufficient accuracy. (b) Lox-side engine transfer functions have been verified by test. (c) The fuel transfer function gain must be increased by a factor of two and the phase lag by 15^{o}. Only small influences on stability margins result from this change. (d) Stability analyses for AS-503 C Prime Mission indicate a more stable vehicle with four Lox-line prevalve accumulator than with five. If this is confirmed, the change to the four-line prevalve fix can be made very simply. (e) Final AS-503 C Prime stability analysis results will be presented by the various contractors at MSFC on 10-31-68, and a decision on prevalve accumulator fix is expected to be made during that meeting.

2. AS-205 THRUST CHAMBER CHILLDOWN PROBLEM: There was a two-minute, 45-second hold during AS-205 launch countdown due to problems encountered in the S-IVB J-2 engine thrust chamber chilldown. Post-flight data evaluation revealed that the associated redlines would have been met without the hold. The basis for the hold appears, however, to be valid, since there was excessive thrust chamber cooling during the five minute purge preceding the chilldown, and since the chilldown supply gas temperature meter displayed temperatures approximately 100^{o}F higher than expected. Comparison with post-flight records show that the meter was incorrect.

3. S-II "A" STRUCTURE: As we predicted in last weeks Notes, testing was resumed after repair of the plugged area of the common bulkhead. The ultimate flight S-IC cutoff load condition was successfully completed 10-24-68. This condition simulates load predictions for the AS-505 mission with a first stage cutoff acceleration of 4.35 g and a payload of 102,000 pounds. Critical areas of the S-II stage structure which were qualified (flight) by this test were: (1) lower portion of the LH_2 tank, (2) common bulkhead/aft dome/cylinder-aft skirt joint (includes lox bulkhead girth weld) and upper portion of the lox bulkhead (waffle section). Prior to proceeding to the next test, a complete inspection will be accomplished by R-QUAL on the entire structure. The final test is scheduled for 10-31-68. This test will qualify the common bulkhead for the ultimate prelaunch burst and collapse mode, and ultimate design S-IC cutoff condition.

4. MID-TERM REVIEW OF J-2S IMPACT STUDIES: The two-day (Oct 23 & 24) review of the J-2S Impact Studies was well attended by representatives from each of the contractors, NASA Headquarters, KSC, and key personnel at MSFC. North American Space Division, McDonnell Douglas, IBM, and Boeing have completed about 60% of their investigations to determine the stage deletions and/or additions required for implementing the J-2S engine. The contractors were cautioned to keep low-cost a primary objective, to make every effort to use qualified hardware in cases of additions, and to examine carefully any identified requirement for requalifying redesigned components. It is now appropriate to ask KSC to join us to determine the effect on Launch Operations, and steps are being taken to get them involved.

5. BERYLLIUM TECHNOLOGY: In pursuit of advancing beryllium to a usable structural material, we have been successful, in cooperation with Solar, in preparing an all beryllium brazed honeycomb panel. This is a first in beryllium honeycomb technology and eventually should be the solution to many structural problems requiring minimum weight and high stiffness.

NOTES 10/28/68 MAUS

AAP COST AND SCHEDULE BASELINE TASK FORCE:

A meeting of this task force with MSC, KSC and MSFC was held at Marshall on October 22 to review AAP development plans and resource requirements. The major AAP problem to arise was that MSC cannot meet the present plan (ML-15 schedule) regardless of the availability of funds. They estimate that a success schedule would be a three month slip, however they expect to slip six months. KSC and Marshall can meet this schedule, however MSFC will require $40M over the FY-70 guideline. In the event a schedule slip is granted, we will have no increased funding requirement in FY-70, however it is obvious that MSF is going to strongly resist any schedule slippage. There is a follow-on meeting of this task force scheduled at MSC on Monday, October 28 to discuss this and other problems.

ASSISTANCE TO HARRY FINGER:

In response to a request from Ray Kline to Harry Gorman, Jerry Fox went to Headquarters on October 25 to assist Harry Finger in preparing a presentation on NASA resources management. The presentation will be given at the NASA Management Council Meeting October 28.

NOTES 10-28-68 MOHLERE

NO SUBMISSION THIS WEEK.

NOTES 10/28/68 MURPHY

Negative report.

NCTES 10/28/68 RICHARD

AS-503 C'Mission Briefing to KSC: At General Phillips' suggestion and a followup request by KSC/LVC personnel, a briefing on AS-503 C' mission was given at KSC on 10 21/68. MSFC participants were from I-V-E, I-K (Colonel Montgomery's Cffice), and R-SE with the presentation being given by R-SE. About 35-40 KSC people attended, and the briefing was very well received.

NOTES 10/28/68 SPEER

1. AS-205 NPSH Flight Mission Rules: Reference your comment to Notes 10/7/68 (copy attached). Castenholz was present during the discussion at which Gen. Phillips overruled our recommendation and stated to Gen. Phillips that the J-2 could explode if NPSH drops below 100 feet. This statement is agreed to by MSFC as well, but we have no direct test data to substantiate the probability or magnitude of the explosion. Rocketdyne will run a special test in early November to lower the NPSH until the engine destroys itself or otherwise shuts down. On AS-205, after review of all factors involved, Paul Castenholz agreed with us to accept Gen. Phillips' decision and to consider this situation an acceptable risk. I am enclosing a copy of Gen. Phillips' letter on this subject for AS-205. The same mission rule on AS-503 is open, pending both the Rocketdyne test and the flight evaluation of the S/C onboard displays by the Apollo 7 crew.

2. AS-205 Flight Data Status: The AS-205 mission data delivery from GSFC and KSC has been satisfactory. Priority data items that we identified prior to flight were delivered in a timely schedule for our data reduction facilities at MSFC, Slidell and MDAC. With the exception of Hawaii Rev 2, data quality was satisfactory. Approximately 80 percent of all requested data has now been received. Still outstanding are data from Redstone ship, of principal interest for the determination of systems lifetime in orbit.

2 Enclosures: (DIR's copy only)
1. Notes 10/7/68 Speer
2. Ltr fm Gen. Phillips, dt 10/3/68

NOTES 10-28-68 Stuhlinger

1. VISIT BY MR. BEGGS AND MR. LUNDIN: The visitors showed great interest in our experimental work in meteoroid physics, infrared physics, superconductivity, and radiation measurements. They made statements to the effect that science-oriented inhouse work will be of vital importance in future NASA programs.

2. MAGNETOHELIOGRAPH PROJECT: A project review meeting was held on October 24-25 with Drs. Tousey and Bruckner from NRL, Drs. Glaser and Oertel from OSSA, and members of the ATM Project Office. The progress of the project was satisfactory to all participants. Continuing funding of the project is expected from OSSA (Dr. Glaser) and, hopefully, our ATM Project Office. The most significant result of the project will be an improved solar flare prediction capability.

3. METEOROID SIMULATION FACILITY: Mr. Howard from JPL spent last week with SSL for a series of high velocity impact tests on Mariner '71 shielding materials. We experienced some difficulty in the form of break-up of some of the 0.5 mm pellets; this size had never been fired before. Mr. Howard obtained five shots of passable quality, and two good shots. We will continue testing of Mariner '71 samples which Mr. Howard left with us.

NOTES 10/28/68 TEIR

TERMINATION OF THE 207/206 DUAL LAUNCH MISSION:

Reference is made to my notes dates October 21, 1968, (copy attached).

All concerned contractors have been notified to cancel the 207/206 dual launch mission and to place the stages in long term storage.

NOTES - WILLIAMS - 10/28/68

I. EARTH ORBITAL PROGRAM

a. Space Station Phase B Workstatement: A first draft of the "Space Station Program Definition (Phase B)" has been distributed to the Laboratories for evaluation and comments. Headquarters personnel will visit MSFC and MSC next week to review status on Center work prior to submittal of first drafts by the centers.

b. Microwave Transmission: We had an informal discussion with R-SSL and R-ASTR on 10/18/68 as a followup to the meeting you had with Raytheon/microwave transmission of electrical power and its application to space stations. We provided generalized power requirements sufficient for SSL (Bill Robinson's) present needs. R-SSL & R-ASTR have been invited to meet with us again on a continuing basis as we obtain more detailed space station power requirement specifications.

II. LUNAR PROGRAM

Lunar Roving Vehicle (LRV): Monies have been received to conduct the LRV Study. The RFP is being prepared and target release date is 11/1 (depending on Headquarters' written o.k. of statement of work).

During a recent trip to Flagstaff, James Belew spent several hours with Ben Milwitzky discussing the LRV program. It appears that the LRV is going to be funded for a hardware start in FY 70 and that MSFC has the job if we want it. At least $1.4M will be available in FY 69 for supporting development and an estimated $8M in FY 70. In addition, $11M has been requested for hardware go-ahead in FY 70. Milwitzky has talked to Dr. Pickering about JPL doing the Lunar logistics landing vehicle. JPL is interested and will submit their plan to do the job to Milwitzky.

III. LAUNCH VEHICLE PROGRAMS

a. Integral Launch & Reentry Vehicle and Low Cost Earth Orbital Transportation System Synthesis for Economic Analysis: ($300K, 9 months; and 200K 12 months, respectively). We have received funds and Headquarters' concurrence on work statements for both studies and purchase requests are being processed (which include tip tank and Big Dumb Booster concepts). Our plan is to be under contract by 12/31/68.

b. NASA-DOD Coordination on Intermediate Vehicles: On 10/22/68 the working group on Intermediate Launch Vehicles of the AACB Launch Vehicle Panel met. Both the NASA & DOD (Air Force) submitted reports containing preliminary data on configurations of interest. Sufficient data does not exist at this time to respond to the AACB request to investigate vehicle candidates and make recommendations for mid to late 1970's. The Air Force has not studied its vehicles in detail and would not provide cost data on the pressure-fed, storable concept (Big Dumb Booster). The working group will ask for additional time. The Air Force has asked for $1.5M and 8 to 12 months to do this. It appears that a most important area for MSFC to work on is to scrub down our costs on our Saturn derivative concepts so that we are competitive. We need to develop a set of cost numbers that reflect our position in 1975. So far we have basically been quoting today's costs. We propose an in-house effort led by IO, and supported by the various laboratories and offices of R & DO.